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ABSTRACT

A study explored the role of peer collaboration in literacy development as a case study in the broader inquiry on the social nature of learning and cognitive development. Fourteen low-achieving 7- to 9-year-old children in a third-grade urban classroom used a word processor to write four stories individually and three stories collaboratively with a partner over a period of 3 months. The individual stories, the collaborative stories, and the transcripts of their collaborative processes were analyzed to identify children's expertises as writers and to trace any transfer of knowledge between partners. Results showed that almost all of the story elements added after collaboration had been the focus of children's talk as they composed together. All children showed the ability to give and receive information via transfer. Certain affinities with expert/novice pairs were demonstrated among the children work teams. A case study of two students' collaboration over time illustrates how children bring diverse expertises to bear as they teach each other how to write stories. The literacy learning process involves intense engagement among peers who share their relative expertises as they focus intellectual and social energies on the text they create together. Furthermore, the repetition and co-construction characterizing novice peer interaction may be a unique benefit of peer collaboration. (Ten figures and three tables of data are included. Contains 70 references.) (HB)

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Center for the Study of Writing



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ABSTRACT

The study described in this paper explores the role of peer collaboration in literacy development as a case study in the broader inquiry on the social nature of learning and cognitive development. The goals of the study are to describe social aspects of the literacy learning process among young peers and to synthesize distinct strands of research on collaboration toward a comprehensive understanding of learning as a social process. This study of the nature and outcomes of collaborative writing by low-achieving seven- to nine-year-old children illustrates that children can develop understanding and use of complex aspects of literacy by working with their peers, and that the collaboration process among young novices is similar in some ways to that of experts working with novices. Fourteen seven- to nine-year-old children in a third-grade urban classroom used a computer word processor to write four stories individually and three stories collaboratively with a partner over a three-month period. Analyses of children's individual stories, collaborative stories, and transcripts of their collaboration processes as they composed together were done to identify children's expertises as writers and to trace any transfer of knowledge about the writing process and the structure of stories between partners. Analyses of the 7,512 talk turns in the collaborative composing sessions showed that 95% of the story elements added after collaboration had been the focus of children's talk as they composed together. And, children who demonstrated even minimal ability to write stories transferred basic aspects of story structure to each other. Toward the goal of learning more about the social nature of literacy development, we related children's collaboration processes to those identified as important in teacher/student collaborations where children serve as apprentices to master teachers (Collins, Brown, & Newman, 1989). Like expert/novice pairs, young peers used generative processes, specifically initiating new story elements, in about 22% of their utterances, and reflective processes, including disagreeing (contesting) over the content and structure of their stories in about 15% of their utterances. In this process, children alternated master/apprentice roles similar to those described in expert/novice collaborations, yet 70% of children's utterances were devoted to repeating proposals or corrections of text sequences. A case study of two students' collaboration over time illustrates how children bring diverse expertises to bear as they teach each other how to write stories. This study shows that the literacy learning process is one involving intense engagement among young peers who share their relative expertises as they focus intellectual and social energies on the text they create together. This peer collaboration process is similar in some ways to expert/novice collaboration, but the repetition and co-construction that also characterizes novice peer interaction may be a unique benefit of peer collaboration, accounting for growth in the absence of instruction on mature strategies.

Collaboration Between Children Learning to Write: Can Novices Be Masters?

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BACKGROUND

During the twentieth century, teachers and researchers have become interested in understanding the social aspects of learning and development. Development and subject mastery have been shown to require more than transmission of subject matter and skills from teachers to students. Research has shown that the development of complex skills like reading and writing is influenced by myriad aspects of social life, including the nature of discourse among teachers and students of different socio-cultural groups (DiPardo & Freedman, 1988; Heath, 1983; Hull, 1989) and the different types of social interactions around literacy (Cazden, 1988). Through recent theory and research, the role of the teacher has increasingly been characterized as one of a collaborator who guides children in their knowledge development while working with them on academic problems. When the teacher is a collaborator, the role of the student also changes, and research has offered explanations about the nature of students' control over their own development (Brown & Ferrara, 1985; Bruner, 1966; Dewey, 1938; Palinscar & Brown, 1984; Piaget, 1967). With this view of children as active constructors of knowledge as a point of departure, researchers have explored the possibility that children can learn from each other. One well-known strand of research focuses on "cooperative learning" (Johnson & Johnson, 1979) where children work together in structured cooperative groups. Other researchers have begun to explore peer collaboration on more open-ended tasks in writing and problem-solving to gain information about how children organize and benefit from social aspects of learning (Daiute & Dalton, 1988; Dyson, 1989; Forman & Cazden, 1985). Unfortunately, this wealth of research exploring collaboration between teachers and students on the one hand and among peers on the other has not yet been coordinated. Without a comprehensive view of collaboration research, it is difficult to address questions like "Why is it that collaborations among young students appear to be effective, like those between teachers and students?" There may be important similarities between expert/novice and peer collaborations; there may be very different benefits of each. Or different patterns of social support may prove effective for

different children, depending on their socio-cultural backgrounds and the nature of the goals and tasks they face. This paper explores similarities between different types of collaboration by relating theory and research on expert/novice and peer collaboration and by analyzing the processes and effects of peer collaboration among low-achieving third graders to test these similarities. A review of research on each type of collaboration illustrates potential links that could form the basis of a more comprehensive view of collaborative learning.

Expert/Novice Collaboration

One line of collaborative learning research has focused on "expert/novice" collaborations—teachers working closely with their students on academic tasks and parents guiding their children on games and life skills. Expert/novice collaboration embodies a transmission model of learning in which the adult or expert transfers knowledge and skills to a child or novice. Differing from the characterization of "teacher" in classic transmission models, however, the expert engages the student in his or her expert thinking and practice as they work on activities and solve problems together. In this process, the expert reveals both knowledge and skills. In addition, the expert assesses and guides the novice's participation, gradually handing over control of the activity to the novice in response to the novice's increasing competence. Although descriptions of expert/novice interaction differ in the degree to which they emphasize joint activity between the expert and the novice, they emphasize the need for the expert's knowledge and metacognitive management of the process—including the ability to plan and reflect explicitly on the subject matter and processes in question.

A useful metaphor that has recently been offered to describe the expert/novice collaboration process in educational contexts is cognitive apprenticeship (Collins, Brown, & Newman, 1989). Apprenticeship is a teaching/learning technique that has been successful in professions such as medicine and law as well as in crafts such as weaving. In an apprenticeship arrangement, an expert in the field involves students in meaningful projects and allows students to be helpers in the process until they can proceed on their own. In traditional apprenticeship arrangements, the common goal is to make a piece of furniture, a garment, or some other object. In cognitive apprenticeship, the process revolves around intellectual tasks that may or may not involve physical activity, but often have a tangible outcome, such as understanding a text, solving a problem, or writing a story.

Cognitive apprenticeship is a metaphor that highlights commonalities among innovations and research in reading, writing, and mathematics. Reciprocal teaching (Collins et al., 1989; Palinscar & Brown, 1984) involves teachers and students working through the process of comprehending texts together, as the reciprocal teacher models the expert reading strategies of asking questions, summarizing, and predicting as she reads through a text aloud. This modeling is more than demonstration because the teacher

engages students in the reading process as it progresses, and she invites her students to take control of the process by helping them assume the role of teacher and coaching them in how to do so. Procedural facilitation is a philosophically-similar method used to help beginning writers reconceptualize the composing process as they learn to use strategies for developing and transforming information in texts rather than writing what comes to mind as it comes to mind—a typical beginning strategy (Bereiter & Scardamalia, 1987; Collins et al., 1989). In procedural facilitation, the teacher offers students support in the form of prompts that engage them in formulating, reformulating, and synthesizing ideas as well as in expressing ideas. Finally, in mathematics, students are offered heuristics for solving problems that are clues to the expert's success (Collins et al., 1989; Schoenfeld, 1985).

These examples of cognitive apprenticeship reflect several important features of expert/novice collaboration. One essential aspect of apprenticeship is the child's gradual participation in culturally-meaningful activities. Research on guided participation in traditional and modern societies (Rogoff, 1990) emphasizes involving children in tasks that are meaningful in the society as construed by adults. Guided participation assumes that children have observed the activity in context, which increases their awareness of the importance of the activity in their society, that children take part in the activity in context—albeit in minor ways at first—and that adults invite and support children's increasingly complex and independent involvement in the activity. The expert orchestrates his or her modeling of the activity, coaching of the student, and fading of all support, by continuously assessing the student's ability to perform independently.

Collaboration with an expert is also presumed to be effective because the expert has access to successful strategies. Since good readers tend to summarize those questions, and predict what comes next in a text (Pearson & Dole, 1987), these are the strategies that experts model in collaborative reading. And since planning and evaluating text are important to experienced writers, these are the obvious ones to include in writing instruction. In addition to proposing specific strategies to use on challenging academic tasks, the experienced reader (writer, problem-solver, etc.) uses strategies flexibly to approach a task, to check for understanding, or to find a new approach when initial ones fail. Similarly, research on guided participation among adults teaching children life coping skills like scheduling shows that the adult has an awareness of how and when to use strategies as well as specific procedures for completing the task at hand (Rogoff, 1990). Although content knowledge is typically considered to be the major criterion of a good teacher (Hirsch, 1987), this process knowledge has recently been shown to be an important quality of effective teaching.

In their survey and analysis of research on cognitive apprenticeship, Collins et al. (1989) isolate two general processes across studies that occur in cognitive apprenticeship—generativity and reflectivity. Generativity involves the flexible production and development of ideas. An expert writing coach prompts children to develop ideas for writing by proposing key phrases

like "Another reason" which offer hints about adding supporting detail and explanation in a text. Similarly, expert readers engage their apprentices in generating questions to guide their comprehension of a text. A complementary process to generating is reflecting—thinking about and evaluating ideas and language that have been produced or read. This involves reconsidering the ideas and text that have already been written or read and evaluating the text according to the goals of the writing or reading task. Since beginning writers and readers do not tend to engage in explicit reflection spontaneously, an expert collaborator may be essential for modeling such strategies.

In summary, research on expert/novice apprenticeship characterizes the teacher as a collaborator with substantial content and process knowledge who possesses the ability to engage students in meaningful tasks, the ability to assess students' progress dynamically, and the ability to use effective strategies. Research has not yet, however, explored whether it is the cluster of qualities described in expert/novice research, specific aspects of the process, or the meaningful context (Bransford, Vye, Adams, & Perfetto, 1989; Brown, Collins, & Duguid, 1989) that has led to success. Meaningful context, for example, may have more impact on development than the specific strategies used by teachers and learners. On the other hand, the specifics of social interaction may be crucial for helping children gain access and control over meaningful learning opportunities. And, highly-scaffolded modeling, coaching, and fading may account for some but not all development. Even if all these factors contribute to learning and development, it is important to understand the relative contributions of each. Research on peer collaboration has begun to elaborate the picture of social processes in learning by identifying spontaneous interaction strategies that are helpful to children.

Peer Collaboration

While there are specific proposals and research on the nature of knowledge transfer from experts to novices, the processes of interaction and growth in the context of peer collaboration have just begun to be explored in detail. Peer collaboration has proved to be an effective catalyst to increased achievement in writing (Daiute & Dalton, 1989; Dyson, 1988), social studies, mathematics, and problem solving (Johnson & Johnson, 1979; Slavin, 1985; Webb, 1986). Several factors have emerged from experimental research to account for the success of peer collaboration, including interdependence among partners, equality leading to the potential for argument, and heterogeneity in perspective gained from racial and ethnic differences but not from gender differences or big differences in ability (Johnson & Johnson, 1979; Slavin, 1985). The few studies involving observations of children's collaborative problem-solving have shown that even very young children devote considerable effort to working on challenging tasks with peers, and develop complex skills such as writing and scientific problem-solving when

coordinating their efforts (Daiute, 1989; Daiute & Dalton, 1988; Dickenson, 1986; Forman & Cazden, 1985; Webb, 1986).

One line of research on the peer collaboration process shows that when collaborating on writing tasks, children examine their own knowledge and beliefs as they require each other to repeat, clarify, expand, and justify their proposals and evaluations of text sequences (Daiute & Dalton, 1988). A specific process identified in this research is playing. When writing together, children play with language, academic concepts, reality, and each other. For example, as children play with the sounds and meanings of language when they produce character names for a story—"Chrissy the crocodile; Davey Crockett the crocodile; cramped crocodile; cranky crocodile," they are exploring the properties of language and the nature of character development in fiction. Coming up with a new, different, funnier, more exaggerated, or unpredictable word is a generative process. Through such play young peer collaborators exchange, examine, and expand their ideas as they help each other in this spontaneous, child-like way (Daiute & Dalton, 1988; Daiute, 1989; Dyson, 1989; Pellegrini & Galda, 1982). This playful generativity is not explicit like the expert strategies of goal-making, planning, or listing (Bereiter & Scardamalia, 1987), yet children's play around academic tasks reveals a set of strategies that is effective for them as they gradually acquire the more explicit strategies of planning and revising (Daiute, 1989). And children who balance their planning and revising activities with such implicit playful control strategies are the children who benefit the most from collaborating (Daiute, 1989; Daiute & Dalton, 1988). Thus, the strategies and contexts that children develop spontaneously as they play reflect their expertise. Such connections between children's forms of generativity and expert generative strategies may provide links between expert/novice and peer collaboration.

Child-initiated play contexts are meaningful to the children who create them. As children play around the academic tasks they have to accomplish, they introduce and work on material that they find compelling—creating their own curricula. Through play, children introduce familiar and salient topics and processes that provide a context for acquiring new knowledge and mastering new skills. In the contexts of play themes like romantic relationships and war games, children play with new vocabulary, spelling, punctuation, text organization, and character development. As they introduce their own themes, needs, and agendas into a school-based task like collaborative writing, children draw on their own expertises, like their penchant to play and to explore. Children's play is more personal and idiosyncratic than expert-designed apprenticeship activities, but if relevance is an important feature of cognitive apprenticeship, the contexts children create during collaborative learning activities may include some elements of apprenticeship.

Another successful peer collaboration process that is sometimes an element of play is cognitive conflict—disagreeing, arguing, contesting—for the elaboration of knowledge and processes (Daiute & Dalton, 1988; Dyson, 1989; Genishi & Di Paolo, 1982; Mischel, 1979; Mugny & Doise, 1978). When

children disagree, they examine their own thoughts as well as those of others, and thus are more likely to clarify, refine, and expand their thinking than when they work without question. Expressing and engaging in conflicts elaborates discussions by involving children in formulating and examining more ideas and perspectives than if they listen to advice, even good advice. In addition, being able to listen to and to share in the perspective of a person who is slightly different in development is another value of cognitive conflict (Mugny & Doise, 1978; Perret-Clermont, 1980). Hearing a different interpretation of a common problem appears to help children grow because as they hear a different point of view they contrast it to their own, coordinate the points of view, and advance to a new level of understanding. This tendency among peers to question, critique, and challenge each other requires some reflection—a process mentioned in expert/novice collaboration. Analyses of children's talk as they compose together have revealed that they develop their disagreements by posing alternatives, by questioning each other, and by using control strategies such as labeling and playing one-upmanship games. Such strategies are implicitly rather than explicitly reflective and evaluative strategies. For example, a child who poses an alternative approach or solution during collaborative problem solving is implicitly giving a negative evaluation of her partner's proposal. Although implicit, such intellectual conflicts are reflective in supportive ways that may be similar to the reflection of experts.

Explaining is another effective peer collaboration strategy (Webb, 1986). Webb found that children in peer groups who had the job of explaining tended to improve on criterion tasks more than children who did not. Similarly, researchers who study cross-age tutoring find that tutors, who are usually older children, improve in the skills they are teaching as much or more than their tutees. The activity of having to master and organize ideas sufficiently to explain them to someone else is offered as the cause of this success. Children's explanations are not, however, complete, correct, or well-formed by adult standards, yet peers act on them in ways that seem appropriate based on subsequent comments and actions (Daiute & Dalton, 1988). Explaining is one type of activity that a teacher is valued for, but the research on peer collaboration highlights the importance of the learner being an explainer. If explaining is as important as receiving explanations, the role of the expert's knowledge must be explored further.

In summary, this research on peer collaboration indicates several factors that have been described in expert/novice collaboration. First, in the context of peer collaboration, children often play, and by definition, "play" involves the spontaneous creation of a meaningful context. The themes and games of children's play thus create relevant and effective contexts for school work (Daiute, 1989). Second, the strategies that children spontaneously use in their peer collaborations appear to be implicitly generative and reflective. Children begin to engage in marked control of their cognitive and composing processes in early adolescence (Bereiter & Scardamalia, 1987), yet implicit control strategies like play and disagreeing remain essential catalysts to growth

throughout childhood (Daiute, 1989). This analysis reveals underlying similarities between expert/novice and peer collaboration and possible differences in how generating and reflecting are done by expert/novice and peer collaboration teams. Viewed in this way, expert/novice and peer collaborations appear to be linked in ways that serve as the basis for a comprehensive view of collaborative learning and development.

Describing what young peers do is essential to understanding the social nature of learning and development. While several qualities of experts have been identified as essential instructional resources, the type of help that peers offer each other has been more elusive. Previous research has offered hints about effective collaboration processes, but important questions remain: What is it about collaboration among equally novice peers that supports development, and how do young peers who are not trained as teachers interact in such a way that learning occurs? Answering these questions requires continued research on the nature and effects of peer collaboration and a synthesis of this research with research on expert/novice collaborations. The processes of generating and reflecting are potential links between these two strands of research. Peer collaborators may engage in processes similar to those of experts, if these processes are viewed liberally. Or peers may offer each other very different types of support from experts, such as a common perspective and language. Addressing such comparisons requires some theoretical basis.

TOWARD A COMPREHENSIVE VIEW OF COLLABORATION

Considering expert/novice and peer collaborations together as examples of socially-constructed learning requires addressing theoretical issues about the expertise of collaborators, the nature of social interaction, and the nature of transfer from social to individual development. Vygotsky's work (1978) has offered a theoretical context for studying the role of social interactions in the development of higher order cognitive processes, such as writing and problem-solving. Vygotsky identified social origins of symbolic development in children's efforts to solve concrete intellectual problems with others. The basis of this theory is that all thinking occurs interpersonally—as people interact in social contexts—before it occurs intrapersonally—in the mind of an individual. Although Vygotsky's theory has served as the framework for research on expert/novice and peer collaboration, the theory has been applied in more detail to expert/novice interactions (Wertsch, 1985). The Vygotskian concepts of zone of proximal development, internalization, sign, and activity are as potentially useful for understanding social constructions among peers as they are for understanding expert/novice interaction, but these concepts require further examination, qualification, and expansion to apply to peers.

Expertise as a Dynamic and Relative Concept

One of Vygotsky's major contributions to educational research has been the concept of "zone of proximal development"—the distance between a child's actual level of development as assessed when working individually on a task and the child's potential level of development as assessed when working in collaboration with "an adult or more able peer." According to this theory, a child performs at a higher developmental level with a partner who has extensive knowledge and who can model the culturally-accepted way of doing a task. Drawing on their knowledge and skill, experts can engage children in performing at higher levels of abstraction and performance than they do individually because during collaboration children have access to the experts' knowledge, skill, and coaching. This constellation of expertises is said to create the optimum conditions for helping a child work to his or her potential in the zone of proximal development. As the expert engages the child in successfully completing tasks, the child learns new strategies and develops new concepts. This performance with an expert becomes part of the child's experience, and generalizations the child makes from repeated experiences of the kind are then available as the basis for future action (Fischer, 1980). By basing their performance on experts' knowledge and skills, children can work beyond their own individual mastery, but what is the nature of the zone of proximal development when working with a less-than-ideal collaborator?

The width of the zone of proximal development—or the extent of the difference between what a child can do individually and under ideal support conditions—depends in part on various characteristics of the child, such as IQ (Brown & Ferrara, 1985). It may be that the width of a child's zone of proximal development is also affected by characteristics of his or her collaborator. Since many collaborators do not possess knowledge, skill, expert strategies, or the ability to model, guide, and fade these strategies, exploring variations in how the zone of proximal development is created with collaborators of different expertises is an important area of inquiry. Peer collaborators may, for example, provide "low" support like requiring each other to express ideas rather than the high support of introducing new material. Both low and high supports have been shown to affect children's development (Bidell & Fischer, in press; Fischer, 1980), so peers may offer supports that define and extend the zone of proximal development. Peer work may be useful precisely because it offers low support that can serve to narrow the gap between informal learning in the home or on the playground and formal learning in school (Gelman & Brown, 1986). While the skillful scaffolding of trained experts may extend children to the limits of their potential development, collaboration with partners who differ only slightly or differ in some domains may bring children part of the distance in their zone of proximal development. If peers are at the same beginning level of expertise, then the issue of how the zone of proximal development is created could be addressed by exploring the relative expertises of the partners.

Our preliminary research indicates that the zone of proximal development is relative and dynamic. With a peer, a child may not be able to work to his or her ultimate potential, but there has been considerable growth with peers. Even though two children are, for example, beginning writers, they have strengths and skills to share. Novices are experts who vary in their mastery of the myriad aspects of writing skill. And these diverse expertises become useful at different points during a collaboration. One writer may be more facile at spelling, another at developing stories. One partner may know the meaning of a word the pair needs to express an idea, the other partner may know a fact that can help them develop the text. As these different expertises become relevant during the composing process, the expert/novice relationship shifts. And as children come up against their individual limits, they can look to each other for support on performance in complementary domains. For example, Brian, an African-American fourth-grader who was bussed to a suburban school, demonstrated more experience and control over crafting stories with plot twists than his partner John, an Anglo boy who lived in the suburban community of the school. And John offered his expertise on spelling and punctuation rules when the boys came up with difficult words or complex sentences. John was often at a loss for ideas about how to develop a story, and Brian was unsure about punctuation. In such cases, the zone of proximal development shifted with each new topic under discussion. When the issue was how to make a good story, Brian set the standard, "Let's brighten it up a bit," and John challenged for specifics, "so what should his name be?" Although the teacher said these boys were equal in ability, both boys worked beyond their individual ability when they collaborated, and both boys grew as writers after collaborating (Daiute, 1986b). John participated in more complex story-writing schemes than he ever had on his own, and Brian began to write with more precision in mechanics. In addition to participating in new concepts and skills, each child did so in relation to his own strengths and familiar language. This example illustrates a zone of proximal development that is redefined continuously during collaboration as issues are raised for which partners have different knowledge and expertise. In short, there are many different ways to be an expert. Just as there are many domains in which one can be an expert (Gardner, 1985), a child may have one zone of proximal development for mastery of facts, another for story-writing, and another for monitoring mechanical aspects of written language. Since the kinds of complementary expertises Brian and John offer each other may be unique, it is important to explore further whether there is evidence that other young beginning writers can support each other spontaneously with their diverse strengths. "Expertise" has been a useful notion for understanding how teachers can help students work to their potential, and this concept can be expanded to include the notion of shifting expertise to account for what allows peers to work together.

Internalization—The Talk, Action, and Knowledge Development of Peers

Vygotsky characterized learning and development as occurring through a process of *internalization* of concepts based on collective thinking during collaboration. This concept involves making individual the knowledge and processes that occur during collaboration. The end point of internalization is sign development, which is the individual's meaning and generalization gleaned from collective activity. The development of such internalized signs is necessary for higher level thinking processes, and, according to Vygotsky, speech is crucial to sign development because it mediates or creates a relationship between the object of the collaborative action—whether it be solving a memory problem, writing a story or playing a game—and an individual's knowledge. The activity or labor of the interaction is also an important part of interaction, not only serving as the focus for the interaction but also for its role as support of the thinking process. When, for example, collaborators read or write the same text, features of the text offer external support for learning. In addition to speech, activity with an object such as a tool, a toy, or a text, is crucial to the development process because the collective labor around the object engages children in thinking about the object. As they work with objects, collaborators examine and analyze the characteristics, functions, relationships of the object with other objects, and as they do this, they transform speech into concepts and understanding. There are data to suggest that the internalization process requires highly crafted social interactions (Brown & Ferrara, 1985; Wood & Middleton, 1975), but there is also evidence that children develop in less-structured contexts, so the spontaneous speech of young peers should be explored further to gain insights about how it might lead to sign development.

Talking around a challenging task with an expert may be a catalyst to development because of the more complex nature of the expert's speech. When a child collaborates with an expert, the expert asks questions, names concepts as well as physical objects (Wood & Middleton, 1975), and engages in other verbalization that sparks the child's recognition and understanding of abstract concepts related to the activity. Such talk focuses children on the salient aspects of a task, makes connections among different parts of a task, and offers appropriate labels which may serve as aids to synthesis or memory. There is extensive discussion involved in whether and to what extent speech might be necessary in cognitive development, but for the purposes of overtly social situations like collaboration, questions remain about what speech has to be like to exert the appropriate type of cognitive control over symbolizing activity. Novices are not likely to use appropriate labels to direct their partner's attention to just the right features of a task at just the right time to support the partner's understanding. If the crafted speech of experts is crucial to advance a novice's understanding, how do young children learn from each other?

Although novice peers may have equally unsophisticated speech in relation to a task, their talk and activity appear to engage them in cognitions

that advance their knowledge and performance. As collaborators talk around an activity, they are involved in reflecting on what they are doing. Thus, the social context of collaboration provides a reason to think out loud which provides the opportunity to examine one's own thought more explicitly than one might do alone. The presence of a partner who shares the same task requires verbal interaction, and, when there is a common goal, this verbal interaction becomes externalized in thinking about the object of the task, such as a text. It may be that peers gain extensively from simply expressing and hearing what they know via talk and activity (the production and manipulation of objects) and bringing inert knowledge to consciousness (Bidell & Fischer, in press). So regardless of expertise or maturity, having a partner to discuss intellectual material in concrete terms may be of profound help at some points in development of a concept. In addition to dealing more explicitly with one's own knowledge, hearing other perspectives on an issue currently under investigation and comparing one's understandings and reflections to those of others can be a catalyst to the analysis and refinement of one's own perspective. But in order to compare different perspectives, they must be understandable at least in some ways. An expert's knowledge may be so beyond a child that such potential for detailed comparison is minimal, unless the expert is highly skilled in communicating with children. Finally, engaging in active and reflective problem-solving and sharing the burdens of doing a task may also involve children in goal-making and monitoring that experts can do on their own but that peers can experience only when they have the conversational supports and division of labor to reduce burdens on information processing (Bereiter & Scardamalia, 1987).

The activity that is the focus of talk is another vehicle of internalization (Wertsch, 1985). Physical aspects of joint problem-solving like pointing can be aids to thinking and eventually to self-regulation (Vygotsky, 1978). When doing a collaborative writing task, a peer's reminder to add a period sparks a child to think about issues in relation to period placement—the function of the period and the relationship between the period, the words, and ideas—in a way that she would not if this verbal reminder had not occurred. Furthermore, talking about a period in the context of writing sentences may increase a child's awareness and control over punctuation. It is as though children play with text and the concepts of text creation like toys when they work together, presenting their ideas, examining them, using them for different purposes. In this process, children are examining text as an object in a way that has proved crucial to achievement (Snow, Cancini, Gonzales, & Shriberg, 1989), and such examination may be easier for beginning writers and readers to do with company than on one's own. Finally, text itself is an important part of the interaction, not only because it is the focus of talk, but also because it provides support for concept development.

Although novices externalize their thinking, reflect on their thought, language, and activity more in social situations than when working alone, their talk is not typically characterized as instruction. This difference between instruction—explicit teaching of information and skills—and construction—

the development of knowledge and skill by working through problems—is currently a distinction being explored in educational research, but there is not yet clear empirical evidence to indicate whether and in which circumstances one approach is more successful than the other. In addition to exploring the role of expertise, this paper explores the nature of speech involved in successful collaborations among novice peers. Further analysis of the interactions among peer collaborators can offer information about whether any specific characteristics of speech are essential to symbolic development.

In summary, the concepts of zone of proximal development, internalization, and the role of speech, activity, and object in the process of development are potential links across studies of collaboration, but the concepts apply somewhat differently to expert/novice and peer collaboration. When examining peer collaboration, for example, the zone of proximal development is shifting and dynamic. Speech around a concrete activity among novice peers may serve to engage partners' analysis and understanding of what they are doing as it involves them in stepping back from their work to examine it, and children's implicit reflections of their work may be effective in different ways from an expert's highly-crafted scaffolding. Similarly, when considering the nature of internalization based on collaboration with a peer, activity may be central for children because it provides a concrete focus for those who have difficulty working with abstractions. Processes like generativity and reflectivity have been proposed to describe how experts guide novices, but such general processes have not yet been isolated in peer collaboration research. If low-achieving third graders can be effective collaborators, then maybe there is more in common between expert/novice and peer collaboration than has previously been characterized. On the other hand, relating expert/novice and peer collaboration may show that these different types of collaboration are effective for different reasons. For example, expert/novice collaboration may work because of the knowledge and skill imparted by the expert, while peer collaboration may work because it involves effortful speech construction around a cognitively demanding task. The issue of what is learned is integrally related to how learning occurs, and it is no accident that collaborative learning is increasingly being studied in relation to the development of complex, or higher-level thinking processes like writing and reading.

Collaboration and Literacy

One reason for the link between collaborative learning and higher-order thinking skills is the current focus on both topics. More important, however, are the theory and emerging research indicating that collaboration encourages children to express and reflect upon thinking that might otherwise remain unexamined or unelaborated. Writing is a skill that requires much generative and reflective thinking and action. Experienced writers actively control the writing process, planning and forming ideas through their interactions with others. While adults can work alone for long periods of time, researchers

argue that this metacognitive work involves dialectic processes that have been internalized from social interactions (Collins et al., 1989; Daiute & Dalton, 1988; DiPardo & Freedman, 1988; Dyson, 1989). The development of literacy during childhood, on the other hand, involves reading and writing in social contexts to form the basis for subsequent individual literacy skills. Research has shown, for example, that many aspects of a child's cultural background, such as the way in which parents talk and guide learning, influence the development of writing abilities (Heath, 1983). Similarly, teachers' beliefs about literacy and learning affect how students approach writing tasks and organize their thoughts (Freedman, 1987). Even the interactions among young children directly affect the development of their knowledge about the composing process and the nature of written language (Daiute & Dalton, 1988; Dyson, 1988, 1989). While such work has begun to show that social interaction around writing, like reading, mathematics, and science, is important, details of this socio-cognitive theory of writing development have yet to be outlined. We need, for example, to learn more about the nature of social collaboration around reading and writing tasks and the impact of specific aspects of collaboration on the development of literacy skills.

Development of the concept of "story," for example, is a higher order literacy skill, involving the arrangement and synthesis of many aspects of linguistic knowledge including vocabulary, sequencing of ideas, logic, and cultural preferences about the arrangement of ideas. Knowledge such as "a story revolves around a character's problem" and "a news report tells what happened, who did it, ..." has been referred to as discourse knowledge (Halliday & Hasan, 1976; Meyer & Freedle, 1984), text structure knowledge (Englert & Heibert, 1984), rhetorical knowledge (Flood, 1984), story structure (Mandler & Johnson, 1977), and story grammar (Stein & Trabasso, 1982). Research has shown that discourse knowledge is essential to effective reading comprehension (Anderson, 1977; Stein & Glenn, 1979) and writing (Bereiter & Scardamalia, 1987; Hidi & Hildyard, 1983; Langer, 1985). The more children know about the organization and structure of text genres and the more they are aware of that knowledge, the better they comprehend texts (Flood, 1984; Palinscar & Brown, 1984; Pearson & Dole, 1987; Raphael, Englert, & Kirschner, 1986; Stein & Glenn, 1979) and organize texts (Langer, 1985). The elaboration and detail of discourse knowledge has been shown to increase developmentally (Langer, 1985; Stein, 1986). In addition, the development of discourse knowledge is also greatly influenced by oral language patterns in the culture (Heath, 1983); instruction (Graham & Harris, 1989; Graham & MacArthur, 1988); as well as by practice reading, listening, and writing (Applebee, Langer, & Mullis, 1986; Langer, 1985). Finally, research has begun to show that talk around texts helps children gain the ability to deal with written language as an object that has to be organized and crafted differently from speech (Snow et al., 1989). Exploring textual issues in the familiar context of speech is helpful, especially for those students whose spoken language differs extensively from the written code.

STUDY GOALS

This paper describes a study done to learn more about the nature and impact of peer collaboration on the development of story structure knowledge and use in writing. In addition, analyses in this study involve preliminary explorations into the relationship between expert/novice collaboration and peer collaboration. The study focuses on the interactions between fourteen seven- to nine-year-old children in an urban school and the impact of collaboration on their abilities to write stories. In framing this study to make the comparison with expert/novice collaboration feasible, the theoretical concepts of zone of proximal development and internalization are expanded and used as the basis for analysis. Finally, this study traces the internalization process via a pattern of individual products done before, during, and after collaboration, and relating these products to collaboration processes. In this way, we examine relationships between children's collaborative composing and their individual performance over time.

While not a focus of this study, the computer was chosen as the writing tool because it supports the collaborative process in a number of ways. Students can simultaneously view their evolving text on the computer monitor, stopping at any point to talk, plan, review, or make changes in their text; revisions can be made more easily, without the tedious chore of recopying; and the texts themselves, looking uniformly professional on the screen and printout, emphasize the joint construction of the stories and eliminate the marking of individual contributions by different handwriting.

The goals of the study described in this paper are to describe the nature of the peer collaboration process among low-achieving third graders. We explore the hypotheses that expertise is a relative and dynamic concept and that young peers may define for each other shifting zones of proximal development. Several questions guided the design and analyses of the study: 1) What can young children who do not have much experience or success with literacy learn about story-writing from working together? 2) What is the nature of this peer collaboration process? Are there commonalities between this peer collaboration process and key aspects of expert/novice collaboration, specifically generative and reflective processes? 3) How do peer collaborations transfer into changed representations of literacy skill?

CONTEXT AND STUDY DESIGN

The design of this study provided for a variety of types of data to gain insights about children's collaborative writing and individual growth in relation to collaboration. Two pre-collaboration writing samples were used to determine the nature and exchanges of writing skill from repeated writing on similar tasks. Pre- and post-collaboration writing samples by each child working alone were used to determine within-subject changes in text features after collaborative writing. Transcripts of the three collaborative composing

sessions by seven pairs of children offer information about the collaboration process, and collaboratively-written texts expand upon certain aspects of the shared experience that was not conveyed orally. Notes from observations of the writing sessions offer information about other factors related to the experience, such as the types of resource material children used when they were writing and the general classroom atmosphere during composing. Conversations with the teacher also offered valuable information.

As shown in Figure 1, the study design involved four individually-written texts (two before collaborating, one after collaborating twice, and one after collaborating another time) and three texts written collaboratively by the same partners. All the collaborative sessions were tape recorded, and observation notes were taken at most of the sessions.

The School Setting

This study was done in an urban school in the northeast of the United States. The school serves African-American, Hispanic, and Anglo children who live in the school neighborhood and who are bussed from several surrounding low-income neighborhoods. The school is in a low-income neighborhood that is gradually changing as middle and high income people buy and renovate townhouses, but the schools serve mostly children from low-income families. Although the exterior of the building is drab, the atmosphere in the school is upbeat, academically-oriented, and to a great extent child-centered. Since many of the children in the community will drop out of school soon after they go on to middle school, this school setting has been referred to as a haven and a last chance to influence the imaginations and dreams of many children at risk. School-wide assemblies provide a context for the work of students who sometimes read and speak next to prominent adult citizens who are invited to participate in school activities. The participating teacher's commitment to developing reading and writing abilities was reflected generally in this urban school. Children regularly publish their writing in the school literary magazine and share their favorite selections with schoolmates during special "Read Aloud" assemblies.

The Participants

The Teacher

The third-grade teacher who collaborated on this study was recommended by her principal as an outstanding teacher, a writing "guru," leader in the school, and someone who was interested in collaboration. A published author, she uses a process approach to writing instruction and participates in the city's Writing Project, a group of teachers interested in improving instruction. This teacher supportively challenges her students, conveying a sense of respect as she helps students explore the meaning of learning in

Sequence of Individual and Collaborative Writing Activities

Task	1	2	3	4	5	6	7
	I	I	C	C	I	C	I

I = Individual Writing
C = Collaborative Writing

n = 14 third-grade children, 7 pairs

Writing Task Prompts

Write a story about a child who ().	Use the words () in your story, if they fit.
gets lost in the city	map, feelings
becomes principal of the school for a day	workers, decisions
finds a puppy with a note saying "Take care of me."	community, nature
brings a new kid in town on a tour of Boston	adventures, important
gets to use a motorbike for a day	explore, favorite
finds a bag of money	advantages, disadvantages
solves the case of the missing skateboard	different, transportation

Figure 1. Individual and collaborative writing task design.

relation to their own lives and encourages them to use their intelligence and creativity in a variety of learning contexts.

This teacher supplemented basic skills instruction and a phonics-based reading program with numerous activities to develop students' literacy skills. Reading and writing across the curriculum were emphasized. The classroom walls were covered with content-area vocabulary words, and there was an ever-changing supply of fiction and non-fiction books for students to read during their free time. Children read these books, and each day ended with the teacher reading aloud from storybooks and short novels, to which she and the children often referred. The writing curriculum centered on daily journal writing, with the purpose of encouraging students to reflect on their lives and express their thoughts and feelings in a personally-meaningful context. The children also wrote reflections about their field trips and "think" or "feeling" pieces as spin-offs of class discussions or readings. Both the teacher and the students appeared to view reading and writing as the "important work" of the school. Before this study, the children had not done any third-person story writing in school, so this genre seemed an appropriate one to study for evidences of social construction.

The Students

Fourteen children whose schedules permitted participated in this collaborative writing study; the remaining three students in the class participated in individual writing sessions, but did not write collaboratively because of scheduling difficulties. The fourteen collaborators included nine African-American children, two Hispanic children, and three Anglo children. Eight collaborators were girls and six were boys. Eleven of the students received daily remedial reading instruction under the Chapter One program for economically-disadvantaged children, and one student received special education services. Three of the children were repeating third grade, so ages ranged from seven years, nine months to nine years, seven months. At the beginning of the school year, the class took the Metropolitan Achievement Test (Durost, Bixler, Wrightstone, Prescott, & Balow, 1971) and the State Competency Test. The class obtained a median percentile score of 33% on the MAT Reading Test, with a mean of 39.64 (standard deviation—26.31), and they obtained a mean score of 82.3 percent correct on the Reading Subtest of the State Competency Test.

The selection of subjects for this study was based on several criteria. Wanting to put the success of peer collaboration to the test, we selected subjects who are just beginning to develop the complex skills of writing; in fact, these children's literacy scores already showed lags behind the norm. Yet we wanted children who had some preparation both from home and from school to work together. If young low-achieving children could benefit from writing together, this would suggest that notions of expertise could be revised. In addition, by exploring the processes as well as the outcomes of such peer collaboration, we could begin to explore reasons why collaboration works among these children and how it relates to expert/novice collaboration.

Selection of the Collaborative Pairs

The participating teacher felt that it was important to pair children across race in accordance with this desegregated school's goal promoting interracial understanding. Therefore, we selected the seven collaborative pairs from those students who were in the classroom from 9:30 to 11:30 when reading groups and seat work typically occurred, using the following criteria to guide our selection: 1) some complementary academic, personal, and social abilities; 2) racial or ethnic difference; and 3) gender sameness. Previous collaboration research has found that differences in socio-cultural background and ability, as long as these ability differences were not extreme, are positively associated with successful outcomes (Daiute, 1986b; Daiute & Dalton, 1988; Johnson & Johnson, 1979; Slavin, 1985; Perret Clerment, 1980). "Ability" was determined by a combination of the achievement test results described above, class reading group, the teacher's comments on children's relative academic strengths and personalities, and our judgments of children's writing samples. For example, the teacher thought that Eduardo, who was described as bright,

good in skills, but fidgety, would be a good partner for Karl, who was also bright but more socially skilled and focused. The aim was to pair children with others who would benefit from their personal, social, or academic strengths. Because of scheduling difficulties and the relatively large number of African-American children, it was impossible to meet all the cross-race criterion for all the pairs. All seven pairs were of the same gender, and three pairs were cross-race.

Materials

The students wrote all their stories on three Apple II-e computers, using the Bank Street Writer III word processing program (Scholastic, 1987). As discussed previously, we selected the computer as the writing tool because we felt it would support the collaborative writing process by encouraging students to jointly focus on the text as it evolved, developing the text in an interactive, rather than parallel, or side-by-side fashion. Students were introduced to basic keyboarding skills using the Smartype typing instruction program (Daiute, 1986c). Each collaborative session was audio-taped, with the children wearing lavalier microphones.

The general structure of the writing task and the seven specific writing prompts were designed in collaboration with the classroom teacher. Our goals were to build on the children's prior experience and knowledge, while offering them the opportunity to explore and develop their imaginative story-writing abilities. Grounding collaborative writing activities in curriculum topics seems to be a good basis for collaboration since it sets collaboration in the context of some shared material and presents opportunities to debate and develop meanings together (Daiute & Dalton, 1988). Therefore, the story prompts were related to the class' social studies curriculum, specifically about their city, and included vocabulary words that related to the story prompts and that the teacher felt were important in expanding students' vocabulary use across the curriculum. For example, in Figure 1, the prompt "Write a story about a child who gets lost in the city" gives children a chance to write about some of the places that are important to them. And the suggestion "Use the words 'transportation' and 'map' in your story if they fit" provides students with the opportunity to deliberate over and use words deemed important by the teacher and the curriculum. Although some of the words seem difficult for third graders ("community" and "advantages"), the teacher had introduced these words to the children in reading and class discussions before they appeared in the writing prompts. In addition, when presenting the task to the children, the research assistant told them to use the words in the story "if they fit," relieving the pressure from those students who were unsure of the meanings or who did not feel the words would fit well in their stories. Although the pairs differed across their own collaborations and across pairs in the amount of effort they devoted to using the words or any structure implied in the prompts, most of the children used the prompts and the words as springboards, with little of their talk

devoted to "following directions" to use these. Both the story prompt and the vocabulary words were typed in large print on 5 x 7 inch cards and given to the students for reference. The story tasks were randomly ordered and assigned to students to eliminate the possibility of a task effect.

PROCEDURE

Students participated in the study over an 8-week period. In a classroom discussion about the project, we told the children that we were interested in learning about whether children can learn together, as well as from teachers and other adults. We told them that we would be asking them to write several stories on the computer, explaining that the computer made collaborating easier because their stories would not appear in two different handwritings and because it was easy to make changes.

Sessions were scheduled four mornings per week, allowing each student to write twice a week in conjunction with this study. Approximately half of the sessions took place in the classroom, and half took place in the computer lab. We had intended to conduct all writing sessions in the classroom, but the noise involved in moving computers back and forth to the lab led us to stay in the lab when it was free. This mix of settings was not ideal because the context of writing is crucial to the activity, yet with occasional exceptions, the children created a mini-context in their collaboration, focusing very closely on each other and their texts. Every collaborative session was audio-taped and later transcribed verbatim by the researchers who participated in the study. Two research assistants were present for each session, setting up the computer and recording equipment, helping the students on and off the computer, introducing students to the task and providing help with word processing commands when necessary. Although our frequent presence and conversations with children before and after their writing sessions made us an integral part of the classroom, we avoided taking participant-observer roles during the children's composing sessions because we wanted to find out as much as we could about what peers do on their own.

The project took place in two phases: Phase 1 included an introduction to keyboarding, word processing skills, and writing on the computer; Phase 2 included seven individual and collaborative story-writing sessions.

Phase 1: Student Keyboarding and Word Processing Instruction

All of the students had been introduced to computers through the school's computer literacy classes, but none had experience writing on the computer. During the first two weeks, students participated in three 20-minute keyboarding sessions, using the Smartype typing program (Daiute, 1986c) to introduce them to home row and letter key locations. The keyboarding practice was followed by a computer writing session in which children worked individually with a research assistant to learn the basic word

processing skills of cursor movement, backspace delete, and hard return. Using the word processor, the student and researcher engaged in a written dialogue, taking on the roles of an object pair, such as a baseball and bat, and conversing with each other through dialogue on the computer. The dialogues were printed out and children read them aloud to each other at the end of the session.

Phase 2: Individual and Collaborative Story Writing

Students wrote a total of eight stories, beginning with a story about their neighborhood. This text was not used in the analysis but offered students further practice writing on the computer and experience with the story task (students had previously been doing mostly journal writing.) Students wrote two individual stories (Tasks 1 and 2), followed by two collaborative tasks (Tasks 3 and 4). Then, they wrote another individual story (Task 5), a collaborative story (Task 6), and a final individual story (Task 7). This sequencing was motivated by our concern that, although we were constrained by time and certain study design principles, students have sufficient opportunities to demonstrate their writing abilities and that we include both collaborative and individual writing opportunities across time to maximize students' learning and motivation. Obtaining two, rather than one, pre-collaboration writing samples enabled us to compare growth that occurred as a function of successive individual activities to growth that occurred after collaborative activities. Balancing collaborative and individual sessions gave children the opportunity to integrate and make their own whatever they learned from collaborating and provided multiple assessments over time of their individual and collaborative growth. In addition, the individual writing sessions gave students a break from the effortful work of collaborating with a peer, as evidenced in a previous study in which the benefits of collaboration appeared to diminish after three successive collaborative sessions when there was no individual writing (Daiute & Dalton, 1988).

Before each writing session, a research assistant introduced the task to a student or pair by reading the story prompt aloud from a 5 x 8 inch card. Collaborators were given additional instructions to "write your story together, sharing your ideas and taking turns on the keyboard." Children were told that other than taking turns at the keyboard, the only collaboration rule was to be considerate of each other. Students were then given the task card for reference. Research assistants performed the file management (creating and saving text files) for the children and helped with specific word processing questions or problems, but they tried not to intervene in the writing or collaboration because, as mentioned earlier, we wanted to focus on what the children could do together.

In sessions that lasted between 35 and 45 minutes, students wrote and revised their texts. When students said they were finished with their stories, the research assistant asked them to "read the story over as though you were someone else and make any changes that are necessary." This second draft

was saved as a separate file and was the one used for data analysis. Typically, students wrote for about 25 minutes and took 5 to 10 minutes to reread and revise the story. Students were given printouts of the revisions, which they usually added to their writing folders. While sharing at this point was not built into the activity, students sometimes read each other's stories.

DATA ANALYSES

Story Element Coding and Analysis

Since existing story grammars (Stein, 1986) proved to be too global or to offer too much detail that did not address our research questions (Frederiksen, 1975), we developed our own story element coding scheme. Story grammars typically include exposition (setting and main characters), complication (goals, problems) and resolution (Bremond, cited in Laughton & Norris, 1989). Stein and Glenn's (1979) well-known story grammar includes eight categories: 1) major setting (main character); 2) minor setting (time and place); 3) initiating events; 4) internal responses; 5) internal plans; 6) attempts; 7) direct consequences, and 8) reactions (Stein, 1986). Our initial analysis of these third-grade children's stories indicated the need for a coding system that would be sensitive to subtle indicators of change related to story structure and other elements characteristic of narrative writing development, such as the use of past tense, third-person, and aspects of character development like naming. No existing story grammar included the array of story elements that our data included, so we developed a scheme from the children's stories and the elements covered in their collaborative composing transcripts. The children's stories represent a range in story-writing skills, including rudimentary descriptions, unstructured action sequences, more structured stories with beginnings, middles, and ends, structured stories with plots, and elaborated stories. Figure 2 lists the story elements that describe the texts in this study.

There were a few instances of *titles* in the stories, so this was included as a story element. A *story marker* is an explicit opening phrase like "Once upon a time" or "One day," which children gradually began to use over time. *Time markers* account for the use of tenses to indicate the narrative sequence of events, and this category distinguishes the present tense of description from tenses marking the flow of time. Two types of *setting* include the location of the story and elaborations of the setting such as "the stoop in front of my house." Four character categories account for any inclusion of a *character* and description of characters. Character descriptions include *character attributes*, such as names, ages, relationships (mother, brother), etc.; *character feelings* such as happiness and sadness; and *character cognitions*, such as reflecting or learning during the story. The *goal* category accounts for the few character goals that were explicit, most being implicit in the character descriptions, setting, problem, or events. As the children changed from writing stories as

descriptions to narratives, they began to include action sequences or *events* ("James Brown walked home from school") which were marked by a verb, whether or not the verb was time marked. An *event attribute* category was added to capture children's descriptions of action situations ("He walked home so fast ..."). A few children built stories to dramatic *climax* situations, so this category was added although it was not used frequently. Some of the stories revolve around *problems* ("He got out of the house but his mother got him"), and the problem was sometimes elaborated, counting as *problem elaboration*. The *object* category applies to events centering around an object rather than or in addition to a character, and these objects are sometimes described with *object attributes*. While stories written at the beginning of the study tended to end abruptly, subsequent stories had *endings*, which indicated the final state of the main character or action, and *resolutions*, which build upon endings by tying together the events of the story, sometimes in an elaborated way—*resolution elaborations*. The children also included *dialogue*, although it was not punctuated. Although not a structural aspect of stories, dialogue is a classic feature of stories, and one that children begin to use in collaboration (Daiute & Dalton, 1988). Some children completed their stories with *salutations* to the reader, like "Love Anna and Kasha." The children also use *links* (conjunctions) and sometimes included *explanations*, explicitly stating why a character did something. Table 1 gives an example of a coded text.

The unit for this analysis was the T-unit (Hunt, 1965) since the children tended not to use punctuation. Coding involved noting each story element per t-unit. After all the story elements for a text were noted, the coding was summarized on a table indicating the use of an element (type) and the number of occurrences of each type (tokens). The types, thus, indicate the number of unique story elements used over time, and the tokens represent the relative increases and decreases in the use of specific elements. The lists of story elements used by each student in his or her pre- and post-collaboration stories was compared, and a list of "changed story elements" was compiled for each student. These changed story-elements lists include additions, deletions, increases, and decreases in the use of specific story elements.

Collaborative Talk Coding and Analysis

Audio-tapes of the twenty-one collaborative writing sessions for the fourteen children (three per pair) were transcribed verbatim by the researchers. These transcripts include 7,512 utterances by the children (not including researchers' responses to children's questions). An utterance is defined as one speaker's uninterrupted contribution to the conversation, and an utterance ends when the other speaker talks. Transcripts ranged from a low of 863 utterances per pair to a high of 1,219. The goal of the talk coding was to find out whether changes in individual story element use, as described above, were related to talk about story elements during collaborative writing

Story Elements

Title

Melanie's Writing

Story marker

Before Collaboration

Tense marker

Setting

Task 1

today I am going to give a kid a Important transportation in a car

Setting - elaboration

Character

Task 2

They wher Agail name Linda and she tuck A boy on A tour in Boston and He was verrey happy when she tuke him on A tour It aink I think It was a nice to take him on a tour I will to.

Character - attribute

Character - feeling

Character - cognition

Goal

Event

Event - attribute

Climax

After Collaboration

Problem

Task 5

Onue A pourte A time they was A boy name Karl he find A bag of money they were tow boy and the one boy side lese bring these money TO the peoilles and the outhur boy side NO some one code us lost It way note bring the money I wud bring the money to the peoilles if I was you and that was oel for today.

Problem - elaboration

Object

Object - attribute

Ending

Resolution

Resolution - elaboration

Linker

Task 7

they whes A boy he got lost in Boston he had A skatebord he take his map out. and the boy name was manex and thes was A girl name Linda Linda was skerd sh side how do we get out ave here Idont now side manex side so he thike map and side we go these way good by.

Dialogue

Explanation

Salutation

3rd person main character

Length

Figure 2. Examples of story element change in one third-grade girl's writing.

Table 1
Sample of a Text Coded for Story Element Use

T-1: One day (<i>Story Marker, Time Marker</i>) a boy (<i>Character 1</i>) bring (<i>Event 1</i>) a new kid in town (<i>Character 2, Character 2 Attribute</i>) on a tour.
T-2: The Boy came (<i>Tense</i>) on A Tour to Boston. (<i>Setting</i>)
T-3: It was (<i>Tense</i>) important (<i>Event Attribute</i>)
T-4: he was going (<i>Tense</i>) to see he's mother (<i>Character 3</i>) and father (<i>Character 4</i>) and he's brother's. (<i>Character 5</i>)
T-5: The Boy is very Kind (<i>Character 2 Feeling</i>)
T-6: and (<i>Linker</i>) He Love (<i>Character 2 Feeling</i>) His Family

sessions. Thus, the coding focused on the story elements that had changed in the writing of each pair and each child. We developed the coding scheme over several stages after reading the transcripts to familiarize ourselves generally with the contents and styles of the children's interactions. Each utterance was then coded for 1) its relation to story element features that changed for each pair after they had collaborated; 2) its function as initiating, contesting, or repeating. An example of a coded transcript is presented in Table 2.

In addition to linking talk with changed story elements, we wanted to find out whether having a partner who initiated production or discussion of story elements related to developments and changes in story element use. The initiation roles analysis included noting whether a story element discussion or production involved *initiating* (mentioning or producing a story element sequence for the first time in the session). Initiation was thus a way of linking the children's collaboration processes to those of experts reported in previous research. *Contesting* (questioning, disagreeing, or presenting an alternative to a proposed sequence) was another collaboration process included in the talk analysis, as this involves implicit reflection as discussed above. The third type of talk coding is *repeating* (restating or respelling a previously-mentioned text sequence or reference to a text sequence), which was not noted as an expert support strategy in the literature reviewed above but emerged as a major category in our corpus. Initiating and contesting offer information on the features that children know or are interested in exploring further, so they reflect relative expertises among these beginning writers.

A random sample of transcripts was coded separately by both authors. Codings were reviewed and definitions refined to resolve discrepancies. A

Table 2
Sample of a Transcript Coded for Talk Related to
Students' Changes in Story Element Use

Miguel and Nick changed the frequency in which they used the following story elements: story marker, time marker, setting elaboration, character attribute and cognition, goal, event, climax, problem elaboration, object, ending, resolution, linker, dialogue, explanation, and 3rd person main character.

Task 6 (Write a story about a child who becomes principal of the school for a day)

Excerpt 1

N: unc unc one day (*initiate story marker, time marker*) in, one day (*repeat story marker, time marker*) a prin, a new man (*initiate character attribute*) came to our school (*initiate event*).

M: no, a new boy (*contest character attribute*)

N: a new, MAN, principa^l can't (looks at task card with prompt) principal, write a story about a child (*contest character attribute*)

M: CHILD, see, not a man (*contest character attribute*)

N: One day (*repeat story marker, time marker*) a boy (*repeat character*) came to our (*repeat event*)

Excerpt 2

M: one day (*repeat story marker, time marker*) a boy (*repeat character*) said to the principal I (*initiate dialogue*)

N: I (*repeat dialogue*)

M: fifteen, heard (*initiate dialogue*)

N: I heard (*repeat dialogue*) you (*initiate dialogue*)

M: THAT (*contest dialogue*)

N: that, T- (*repeat dialogue*)

second round of coding on a selected sample of nine (three pairs) transcripts yielded an inter-rater reliability of 75%. For the final coding, each transcript was coded and reviewed by both authors; disagreements were discussed and resolved. Talk codings were counted and summarized by student and pair to show the type and frequency of talk codings in relation to changed story elements and the variation in talk roles.

The talk roles analysis was done by individual utterance turns, but we also studied more global patterns of discussion around each story element by each pair. This analysis of story-element-change episodes involved marking off sequences of talk turns around a specific story element, such as the development of a character's name. Episodes were typically sequential, but when a specific story element was discussed, dropped, and begun again, the discontinuous segments were viewed as an episode. This episode analysis revealed specific patternings of initiation, repetition, and contesting for each

pair across time, and a representative case study of one of the pairs is presented in the results section along with references to similarities and differences in other pairs.

A paired-comparison t-test was done to analyze change in the mean number of story elements used before and after collaboration. Specific contrasts included analyzing growth before collaboration on two successive individual writing tasks (task 1 versus task 2) and growth after collaboration (task 7 versus task 2 and pre- and post-collaboration means).

Expertises

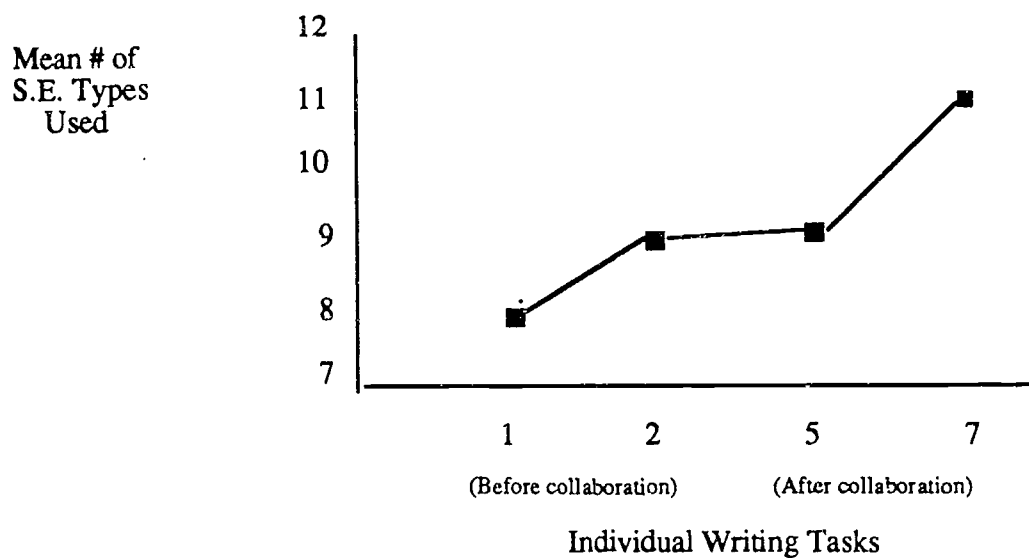
Data from the teacher's interviews, the writing samples, and transcripts served in identifying the relative expertises of these peer pairs. The two pre-collaboration texts and the teacher's comments about the children indicated each child's strengths, particularly their strengths as story-writers. For example, the story features a child used individually before collaborating and those the child mentioned or produced in collaboration sessions were considered to make up his or her expertise as a writer. Similarly, features such as relative precision in spelling, punctuation, etc., was another element of the expertise profile. As the pictures of children's progress over time, comparing writing done before, during, and after several collaboration sessions were compiled, the exchanges of children's expertises were explored. General aspects of these exchanges are discussed in response to the study questions and the detailed case of Eduardo and Karl is presented to illustrate this process of exchange of novices' expertises.

RESULTS

What can young children who do not have much experience or success with literacy learn about story-writing from working together?

Children increased their use of story elements after collaborating. Although the children exchanged a variety of types of information about writing, 75% of their utterances included at least one reference to a story element, as discussed above, including notions of what makes a good story and the elements of a story such as character, setting, and plot. Analyses indicated that children expanded their notions of "story" after collaborating. Figure 2 includes stories written by a girl in the study to indicate a typical type of increase in the use of story elements.

Figure 3 shows the mean number of story element types used on two individual writing tasks composed before collaborating and on two individual writing tasks composed after collaborating three times. Results of a paired comparison t-test done to assess the significance of this difference are also included on this table.



Paired Comparison T-Tests

Task Contrast	Mean SE Change	t	p
1 versus 2	1.07	1.95	.073
7 versus 2	2.00	2.75	.016 *
pre-average versus post-average	3.21	2.48	.028 *

* p < .05

Figure 3. A comparison of third-grade children's use of story elements before and after collaboration.

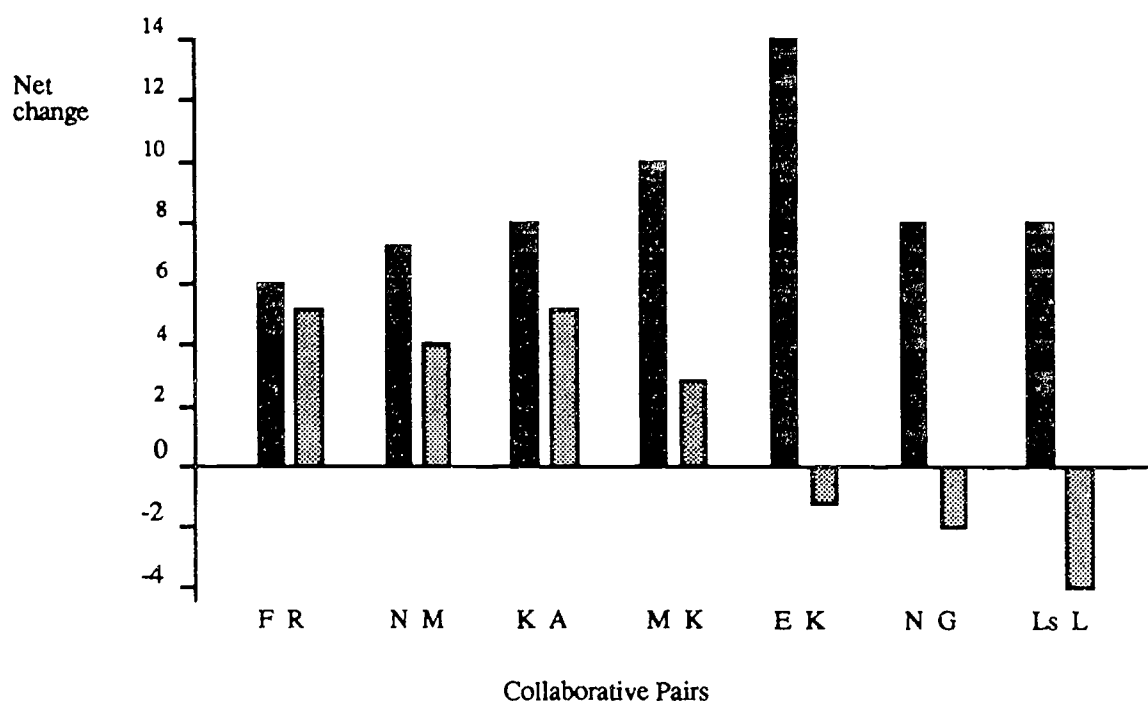
As shown in the graph in Figure 3, the children increased the number of elements in their stories from tasks 5 to 7, after collaborating, more than they increased from tasks 1 to 2, before collaborating. As also shown in Figure 3, the paired comparison t-test indicates that increases in story element use are greater after collaborating several times (task 7 compared to task 2) than in two successive individual writing tasks (task 2 compared to task 1). The larger increase from task 5 to task 7 than from task 2 to task 5 indicates that the effect occurs after a cycle of collaborating, writing individually, and then collaborating again rather than after two collaborations. The increase in story element additions between tasks 5 and 7, moreover, is more difficult to achieve than the increase between tasks 1 and 2 because it is easier to augment beyond a very low number of initial story elements than beyond the relatively well developed stories in task 5. While the fact that a difference from task 2 to task 7 could be the result of time on task cannot be ruled out, the case study presented below illustrates the close connection between the children's talk and specific types of story element changes made on tasks 5 or 7.

Offering more individualized information, Figure 4 shows the number of story elements added or deleted by each child after collaborating. Eleven of the fourteen children in this study added more story elements after collaborating than before collaborating, ranging from increases of 6 to 14 story elements. Three children decreased their use of story elements, ranging from decreases of one story element to four. While such decreases by two of the children support our qualitative assessments that they did not benefit from the collaborative writing experiences, the child whose net number of story elements decreased by one after collaborating did seem to benefit, as shown by qualitative analysis described below in the case study.

What is the nature of the peer collaboration process? Do young peer collaborators use generative and reflective processes, as noted in expert/novice collaboration?

Children used a range of interaction patterns, including initiating, contesting, and repeating. Figure 5 shows the percent of utterances in which each pair initiated, contested, and repeated changed story elements. As shown in Figure 5, initiating ranged from about 5% to 27% of the utterances across the pairs. Detailed analysis of initiating indicated several forms: Initiating literal sequences, gists marked by "how about ..." questions, and parameters—the suggestion of some feature that was needed such as a last name in "Joe what?" Figure 6 includes examples of these types of initiations.

As shown in Figure 5, contesting occurred with a broader range of frequency than initiating—from 5% to about 24%—and overall the children tended to contest slightly less than they initiated. Nevertheless, contesting proved to be quite complex. Figure 7 includes examples of various types of contesting revealed by the detailed analysis.



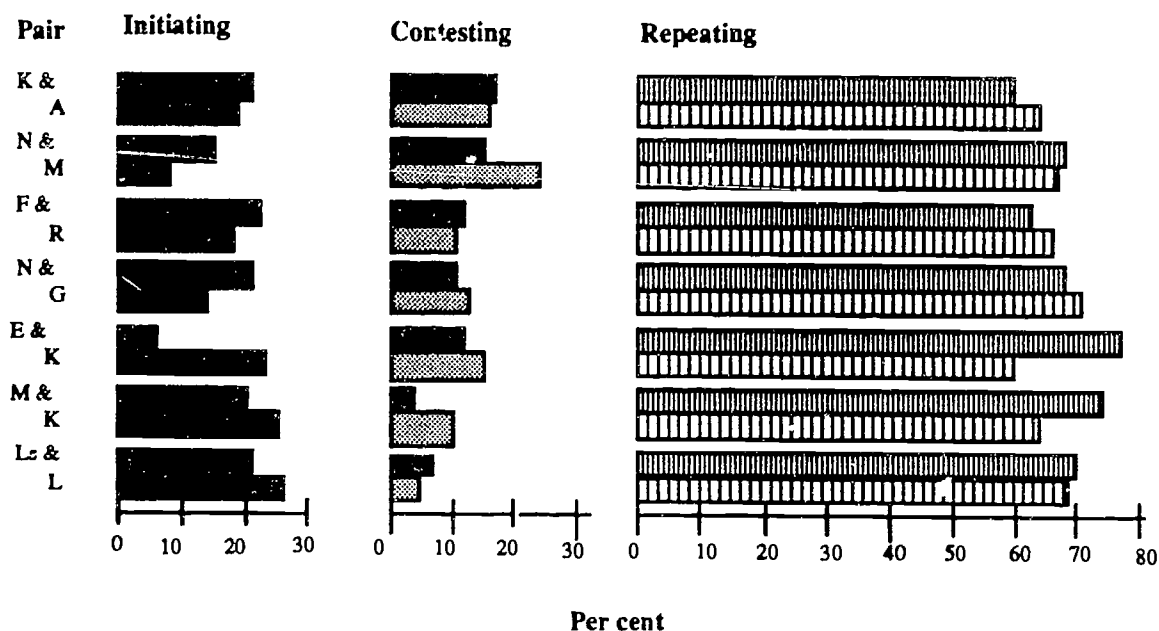
Net change: the difference between the average pre- and post-collaboration story element use. Net change = additions, deletions, and doubled/decreased by half. A 40% or increase/decrease in length from the Task 1 and 2 average word count is included as a change.

Figure 4. Third-grade children's net change in story element use before and after collaboration.

As shown in Figure 7, children contested in a range of ways, including simply negating a partner's initiated sequence (A: named Billy. K: No, no); posing alternatives (K: Mrs. Black? M: Huh, Mrs. Grey! No, Mrs. Brown! Let's name ... K: Mrs. Beth is good); requesting explanations (K: So why we gotta write Billy? ...); and explicitly evaluating (L: It's not the right thing).

The analysis also showed that repeating plays a major role in the construction of stories and story structure knowledge. As shown in Figure 5, repeating was the most common type of interaction around story elements. Figure 8 shows examples of the different types of repetitions, including repeating a partner's suggestions, one's own suggestions, and agreed-upon suggestions.

As shown in Figure 8, repetitions served a variety of functions from returning to the story line after a transgression, shifting focus more closely on some aspect of the story, trying to get one's own proposed sequence into the



Note: per cent times = number of talk codings related to a story element change divided by the total number of codings for story element change. The 3 categories may not sum to 100 due to the dropping out of a 'Supplier' category which represented an average of 1.71% of the total story element change related talk codings.

Figure 5. Talk roles: per cent times each child initiated, contested, or repeated changed story elements.

story, filling time while trying to come up with new material, agreeing, and making sure the story builds coherently. Repeating may also have been exaggerated in this study because children were using computers, which require keyboard knowledge. Yet, the burden of having to remember word processing commands and to find letters on the keyboard when one is not an expert touch-typist may become worthwhile in the reduced task of simply pressing a key to make a letter rather than having to form it, which third-graders still have some difficulty doing.

How do peer collaborations transfer into changed representations of literacy skill?

Children's collaborative talk revolved around changed story elements. The story elements analysis and the talk analysis looked at together revealed that changed story elements were those that children focused on in their talk.

	Example 1
Literal	Raymond: One day there was a skateboard missing. Frank: The boy had dropped. The boy was swimming
	Example 2
	Melanie: Let's write, "today we are talking about a puppy who was (unclear) who gone into nature."
Gist	Karl: Okay, let's go, ready. You write about um a football player. Eduardo: I know.
Question	Miguel: Okay, what should we, after we say "is ours", what should we say?
	Example 1
Parameter	Kasha: Wanna boy or a girl?
	Example 2
	Eduardo: ummmn, thirty-two Karl: Naah, higher. Eduardo: Thirty-four Karl: Higher / fifty. Eduardo: No, man, that's too old

Figure 6. Examples of third-grade children's initiating.

Repeat with a question

Raymond: Because one day there was a skateboard missing.
Because a boy dropped

Fred: Dropped?!

Raymond: dropped his skateboard.

Fred: Dropped?!

Repeat with emphasis

Naomi: That he, she, he

Geraldine: He got

Naomi: SHE

Geraldine: HEEEE (unclear). It was a boy.

Naomi: She saw his skateboard.

Geraldine: Oh (laughs)

Simple rejection

Anna: named Billy

Kasha: No, no

Anna: Yeahhh

Kasha: Nooo

Anna: Billy

Request an explanation

--
Kasha: So why do we gotta write Billy?
'Cause we did all your friends' names.

--
Kasha: 'Cause we did all those boy's names
that you wanted to write.

Explain

Anna: On, on, no, on, on the girls' part
you had (unclear) on the girls' part you had
Linda and I wanted another name.

Evaluate

Lorita & Lisa: My name is Lorita and Lisa.

Lisa: It's not the right thing.

Lorita: What is...What are you doing?

Lisa: My name is Linda and my friend

Lorita: Oh

Figure 7. Examples of third-grade children's contesting.

Example 1

Katherine: Miss..Booth. Mrs. Booth. How d'you spell Booth?

Researcher: Spell it the way it sounds

Katherine: B-o-o-t-h! (laughs). / Miss Booth. Miss Bath!

Melanie: Bath!

Katherine: A

Melanie: O

Katherine: (unclear). Bath. Bath! Bath! .. A-..E-. I know how to spell Beth, darlin'. Boo-Beth. Mrs. Beth. (laughs)

Melanie: laughs

—

Katherine: Mrs. Black?

Melanie: Huh, Mrs. Grey! No, Mrs. Brown! Let's name (unclear)

Katherine: Mrs. Beth is good.

Example 2

Miguel: found (sounding)

Nick: now you start u- and then put a d- there.

Miguel: found

Nick: Ya, found

Miguel: Well, I don't think so

...

Nick: Hmmn, wait wait let me see it, delete. Oh, fou-ound (sounding) -ound, that's right, f-ou-ound.

Miguel: Well, let's do it this way. F-u-n-d-. I think that's the way.

Nick: That's too big.

Miguel: I know, but look. It looks like it, doesn't it?

Nick: (pause). yup.

Figure 7 (cont.). Posing alternatives: a common type of contesting among third-grade children.

**Repeat partner's
suggestion**

Katherine: I...saw....

Melanie: a

Katherine: aaaaaa....little...little

Melanie: little, little puppy today

Katherine: little, help me find it, Mel!

**Repeat agreed-upon
sequence**

Nick: Oh ya, day.

Miguel: day

Nick & Miguel: a-

Michael: y-, day, one day

Nick: a boy, a

Repeat own suggestion

Katherine: it was soft

Melanie: (singing) it was soft as a pillow.

Katherine: it was soft as aah, no, soft as the

Melanie: pillow. (begins singing again). soft as a pillow,
soft as a pillow

Repeat spelling

Karl: L shift. /// Cool, c-o-l-l-

Eduardo: I know, Capital C-

Karl: L.L. Cool, Cool J. j-j-j-j-...///They probably
don't even have a whole sentence over there. Cool..J..
jj-jjj jj-jjj jj-jj jj-jj oh, that's my boy, right
here..

Eduardo: (unclear). L.L. Cool J. and his father's name is
L.L. Cool J.

Figure 8. Examples of third-grade children's repeating.

Table 3 shows the number of utterances in which each pair talked about each story element that either member of the pair changed after collaborating.

Table 3 shows that around 95% of the story elements that changed were the subject of children's collaborative talk. Only three elements that changed were not discussed *by any pair*, and in these cases the collaborative text includes text sequences related to the changed story element. In addition, only one of the elements with negative change was discussed. Thus, children's collaborative talk is directly associated with story element change.

A detailed look at the processes of interaction and resulting changes in story element use by one pair in the study illustrates the analyses presented above and offers qualitative information on the ebb and flow of collaboration, showing that it works through effortful story construction and playfulness, as well as explicit reflective processes.

A Young Master/Apprentice Case

The collaboration by Eduardo and Karl is typical of the successful collaborations in several ways: 1) one partner began to use many more new story elements after collaborating, while the other elaborated on a basic story form; 2) each partner brought a different strength to the collaboration, in some cases different story elements and in some cases different composing strategies, such as contesting; 3) the children alternated generative and reflective roles over time, using a variety of types of contesting as verbal reflection about the nature of stories as a specific story was emerging during the collaboration; and 4) the children exchanged information via a master/apprentice relationship, characterized by alternating initiations of story sequences, checking, evaluating, and expanding story sequences. In addition, Eduardo and Karl's collaboration best reflects the range of interactions across all the pairs, while others have slightly more idiosyncratic styles. For example, Melanie and Katherine's collaboration is characterized by evaluating via presenting alternative sequences, while Anna and Kasha tended to make explicit evaluations and explanations. Eduardo and Karl interspersed both techniques.

As shown in Figure 9, Eduardo made dramatic changes in his story-writing style after collaborating with Karl. In task 1, Eduardo wrote a description/statement of opinion in response to the story prompt. In task 2, Eduardo wrote more fluently and included several endearing details, but his "story" was still a description rather than a narrative. Tasks 5 and 7, on the other hand, are stories formed with beginnings, problems, and endings, including settings, several types of character attributes, and other story features.

As shown in Figure 9, Karl's stories before collaborating exhibit a narrative structure with beginnings and problems but not as much control over the overall shape or development as in his last story. Karl actually added several story elements on his own in task 2 compared to task 1, and the pattern he

Table 3
Number of Utterances About Changed Story Eler

Story Element Change (+, -, >, <) # of utterances	Collaborative						
	A and K	N and M	R and F	N and G	E and K	M and K	Ls and L
title			+				
			114				
story marker	+	+	+		+	>	
	34	47			42	2	
tense marker	>	+			>		> >
	56	171			22		123
setting	+	>	+		>		
	19				38		13 -
setting-elaboration		-	+	-			
		52	8				
character				<			
				109			
character attribute	<	>	<		+	>	
	109	82	43		382	123	
character feeling	-	+	-			<	+
	4		8			18	7
character cognition		+				+	+
goal	-	-	-	+	+	-	
		48		52			
event	>	>	>	<	+	>	>
	24	84	17		35	70	86
event attribute	+	+		+	-	-	+
				-			+
climax		+	+				
problem	>		+	-	+	+	+
	2		32	25	5	1	10
problem elaboration	+	-	+		+	+	-
			6		24		
object		+	+	+	+	-	
			54				
object attribute			+	+			
			50				

developed in task 2 influenced Eduardo. Karl's task 5 story is much more cryptic than all the others, and this fact is what decreased his post-collaboration average number of story elements. Classroom observation notes and the talk transcript for two other students indicate that Karl's decline on Task 5 might be attributed to his talking with two other students about topics other than the story throughout this individual story-writing task. Task 7, in contrast, reveals several types of growth that might have something to do with the collaborative process. In task 7, Karl adds several story elements, including resolution, elaboration and dialogue, that advance his stories

Table 3
(continued)

Story Element Change (+, -, >, <) # of utterances	Collaborative Pair							
	A and K	N and M	R and F	N and G	E and K	M and K	Ls and L	
ending	+ 38	+ - 145	+ 14	+ + 32	+ 5	+ + 25	+ - 1	
resolution	+	+ >		+ 45	+ +	+ +	+ -	
resolution elaboration	>				+			
linker		> 48			> < 6			
dialogue	+ > 35	+ 252		> + 175	>	+ 1		
explanation		- 60	+ 47				-	
salutation	+ 20					+ 35		
3rd pers. main char.	+ 51	+ 101	+ 89	+ 60	+ 88	+ 75		
length	> 8	> > 19	> 8	> 21	>	> > 21	> 21	
# of talk codings about changed SE's	400	1110	490	519	647	413	298	
total # of utterances	970	1441	1038	1046	935	1219	863	

KEY: + (added); - (subtracted); >< (doubled/decreased by half, except in the case of length. For this category, > represents 40% or more increase from Task 1 & 2 average). For example, Anna and Kasha's talk while composing together included 34 utterances related to "story marker," and Anna increased her use of story markers before and after collaborating.

beyond a basic beginning, middle, and end narrative structure. This type of elaboration is similar to the growth made by Kasha and Michael, children in two other pairs who began with basic stories (rather than descriptions or a cross between description and narration sequences). Karl's growth cannot be traced to the collaborative talk or the partner's texts in the way that Eduardo's growth can, but there are several types of evidence that the collaboration was also beneficial to Karl.

Figure 10 includes Eduardo and Karl's talk around the story marker, the development of character names, and character ages—three story elements that Eduardo added after collaborating. Figure 10 shows how Karl introduced the model of story structure underlying his task 1 and task 2 stories by initiating story openers and names. Karl sometimes simply proposed an initial sequence such as "Once there was ..." and sometimes took a more explicit teaching role: "Okay, one, I'll I'll tell you what to do, press shift, I'll tell you what to write. Once n -c - e."

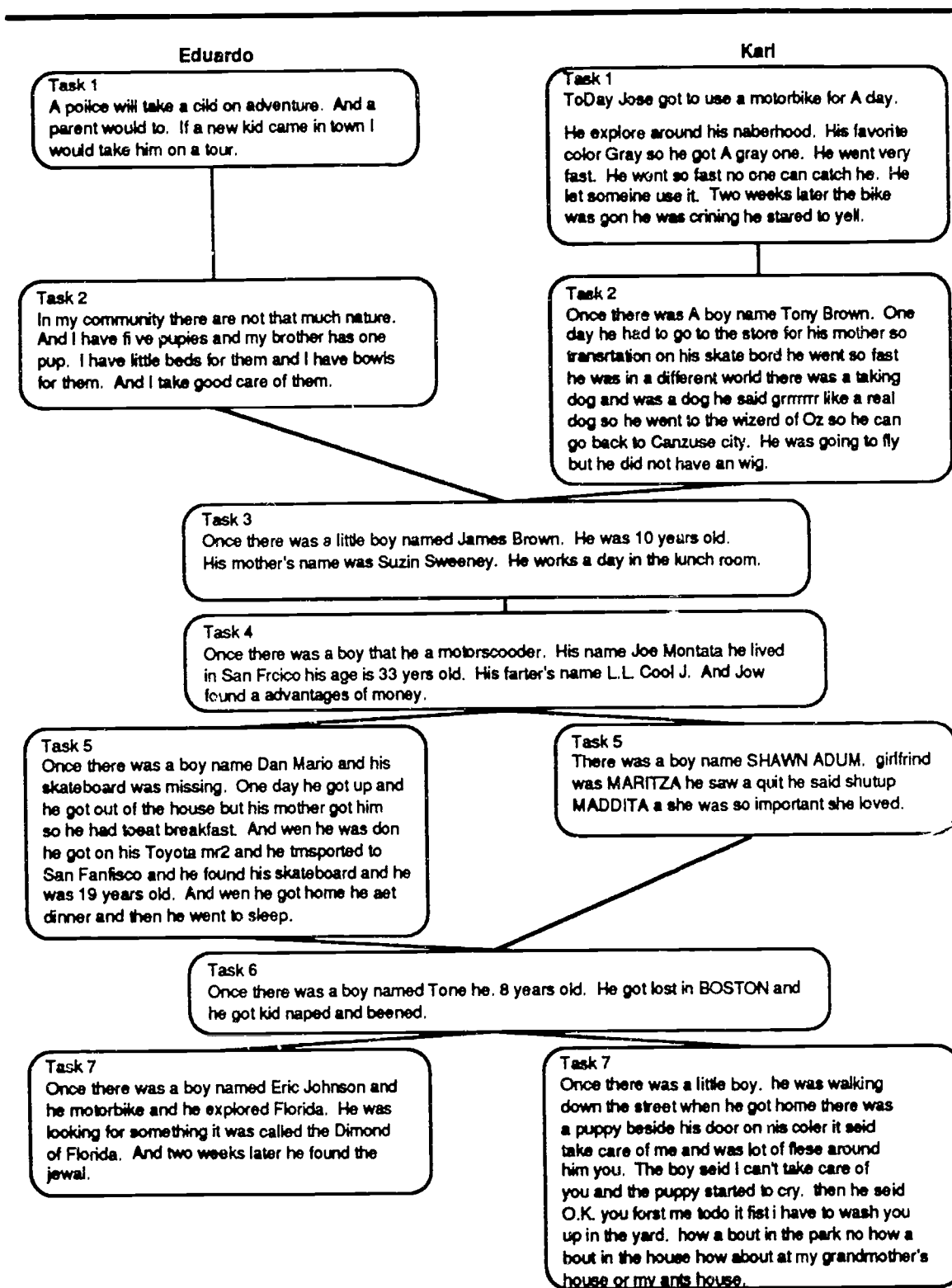


Figure 9. Changes in story element use by one pair of third-grade boys before and after collaboration.

Talk related to the story marker

Task 3

K: Once // and. Where's the c? / c.
 K & E: e
 E: Once
 K: Now you gotta press there.
 E: There
 K: Now see a t-h-e-r-e.
 (Researcher makes comment about eventually switching places at the keyboard)
 K: O.K.
 E: Once there was
 K: was o-a-n-
 E: That's how we're supposed to go
 K: Once there was a
 E: a
 K: a little
 E: Why d'you put a capital?
 K: I know.
 E: Why?
 K: Because /// a little l-i-t- two t-
 E: t-. Yeah!
 (spell out little together)

Task 4

K: Okay, once, I'll tell you what to do, press shift,
 I'll tell you what to write. Once n-c-e-
 E: what is it?
 K: Once
 E: Wait (unclear segment)
 K: We might need somethin', we might need it c -e
 once there...No, motorcycle! There was a little boy ridin'
 on his motor scooter.
 E: Once there was
 K: was a little boy ridin' on his motor scooter!
 E: Once there was
 K: was a lit, a little boy...

Task 6

K: Okay, let's go, ready. You write about um a football
 player.
 E: I know.
 K: How should we start it off? Once upon a time?
 E: How come you, Karl, man you alway do it with once?
 K: Okay, there there was a little boy named
 E: There could be, why do we always write a boy,
 can't it be a girl or something?
 K: Ah, no (chuckle). Okay.
 E: No, no, no.
 E & K: both laugh

Talk related to the character attribute of name

Task 3

K: Once there was a little boy named.
 E: named ///
 K: m-e-d-. Named.
 E: John.
 K: No, not John.
 E: John!
 K: No, not John.
 E: Yeah, John! (whispers) John, John, John.
 K: Okay. I can't think. Wait!
 ...
 K: Oh, watch out. I like to do this. Watch out. Where's
 the h-? Wait, h-. h- n-. John. / John: what?
 E: Why?
 K: (unclear rap segment). Wait, wait. I got it! Press it.
 Where's it. Where's the j? Wait, I got it. James //
 James Brown. b- oops. Press it. Where's the r-?

Task 4

K: Name. /// n-a-m-e-
 E: you always make up your own names. Why can't make
 my name.
 K: Go on.
 E: John
 K: John / j-o- // Hold on.
 E: No, Joe, no um John, Joe.
 K: j-o-e-
 E: e-
 K: Joe what?
 E: Joe Montana.
 K: Montana?!
 E: He's a umm football player.
 K: No, how 'bout Refrigerator?
 E: No, naaa. Joe Montana
 K: How 'bout Russel (unclear segment) like a wrestler
 or somethin'.
 E: Joe Montana just like
 K: How 'bout Jake the Snake?
 E: No, Joe Montana.
 K: I don't know how to spell Montana!
 E: I do!
 K: No, give me a short name that I know how to spell.
 (unclear segment). It's my turn.
 E: No, Montana's easy, m-
 K: All right, just tell me

Figure 10. Talk related to story element change in one third-grade boy's writing.

Talk related to the character attribute of age

Task 3

K: He was ten years old. Ten. Ten.
E: Ten.
K: Ten.. That is 1-0-. 1-0-
E: No, let's write the word.
K: No, no, no. That's that's dumb. Ten. Go.
E: Yeah.
K: Ten or eleven. Or seven. No, seven.
E: Ten. Ten, was ten.
K: Years. e-r-o-. Years s-.
E: Years. S- o-.
K: O- o- l- d-. Old. Old. Keep going.
E: He was ten years old.
K: Space bar. He was ten years old. Period. Period....

Task #4

E: uh, not return, yeah his name, no, his his age.
K: I'm gonna kill you (laughing). a-g-e-.
E: His age was
K: was how 'bout thirty-three?
E: ummm, thirty-two.
K: Naah, higher.
E: Thirty-four.
K: Higher / fifty.
E: No man, that's too old!
K: How bout', how old is Refrigerator?
E: No, how old is Joe Montana, the real Joe Montana?
K: I don't know! What's the number.. on his shirt? (unclear
(word) That's their age.
E: Ummm, thirty-six.
K: Larry Bird's thirty-three.
E: thirty-six.
K: Okay.
E: thirty-six.
K: Okay, Larry Bird's thirty-three.
E: His age
K: age was
E: is, IS.
K: Is? /// Is what?
E: Ummm, thirty-six. thirty-six.

(190 speech turns later, when reviewing their text)

K: Wait, wait. I think I gotta change one thing.
E: What?
K: The age.
E: Why?
K: I don't like that age.
E: Thirty-six, but I thought
K: No, I want TWENTY-six.
E: No.
K: 'Cause he probably, he probably walkin' like this by now.
(gesturing as though walking hunched over).
E: Thirty-six.
K: TWENTY-six.
E: Let's put he's thirty-three.
K: Okay, let's erase this.

Figure 10 (continued).

Eduardo followed along on the first few tasks, repeating what Karl had said and asking for clarification such as "What is it?", but by task 6, Eduardo had developed some ideas of his own about stories, as evidenced in his contesting of Karl's formulaic story opener: "How come you, Karl, man you always do it with once?" and "There could be, why do we always write a boy, can't it be a girl or something?" These protests reflect Eduardo's growing awareness about the complexity of making stories, yet in his texts he used the story marker and other patterns he learned from collaborating with Karl somewhat formulaically. Eduardo began his tasks 5 and 7 with "Once there was" and use first and last names of real people (or at least his version of how to spell real people's names) in his stories.

Since most of the discussion about story elements was literal, such as forming names or pointing to the need for a last name with a question such as "Joe what?" rather than stating explicit rules such as "Let's use real people's first and last names," it is remarkable that such direct transfer occurs. Through collaborative construction of examples rather than didactic teaching, Eduardo has abstracted a story model that he uses with his own particulars in tasks 5 and 7.

In addition to illustrating that children's collaborative talk transfers into individual writing, these examples offer insights about children's apprenticeship methods. Although Karl begins the collaboration sounding like the master and in fact implicitly teaching Eduardo quite a bit about stories, Eduardo assumes several important "expert" functions increasingly across the collaborations. Figure 5 shows that Karl does most of the initiating of story-element related text sequences, but the amount of contesting done by each member of the pair is more equal. Eduardo sometimes initiates such as in the naming example in Figure 10, but he increasingly questions or poses alternatives to Karl's initiations in the second and third collaboration sessions. Through such critiquing, Eduardo assumes a reflective role about the evolving texts, which recent theory would say helps not only his partner but also himself. This pattern of one partner initiating much more than the other is not reflected as extremely in any of the other cases, but a general tendency of one partner to dominate some aspect of the collaborative process with the other partner alternatingly and increasingly trying to lead does occur in the other pairs.

Although Eduardo and Karl were typical in the engagement and richness of their interactions, as well as the focus on story elements and the proportion of contesting and repeating, they differed from some other pairs in several respects. For example, Eduardo and Karl characteristically posed alternatives as a way of evaluating and advancing their stories. In contrast, Kasha and Anna tended to request and offer explanations for their story proposals and disagreements. While the girls sometimes found compromises and rules for alternating decisions over conflicts, they also occasionally proceeded without explicit resolution. The characteristic pattern of initiating by another pair, Melanie and Katherine, was that Katherine explicitly played the mother/teacher, announcing that she would teach Melanie about stories,

while Melanie agreed but took a major role in the story construction by posing alternatives and making metaphors. Finally, Miguel and Nick differed from Eduardo and Karl and the others in their characteristic use of negation and persistent reformation of their own desired sequences.

DISCUSSION

The results of this study show how masterful and effective children can be as collaborative writers. The children in this study expressed their existing and emerging knowledge about how to write stories. They revealed their thinking processes as they composed, and they engaged in generative and evaluative exchanges, which were sometimes elaborate. Through such interchanges, the children, moreover, exchanged knowledge about stories and how to make stories. This knowledge was incomplete and sometimes incorrect, yet through their collaborations, most of the children developed their story-writing abilities.

Novices as Masters

This study shows that novices can be masters. These children were all relatively inexperienced with literacy, yet each child brought strengths to the collaborative writing experiences and used his or her strengths as a writer to organize the writing experience and contribute to the collaborations. Since the children had not planned the course of their collaboration or composing activities ahead of time, the expert shifted throughout the collaboration. For example, Karl tended to initiate story openers and to keep the pair on track through the production of the opening sentence by proposing one, "Once there was ..."; then by prompting his partner for an idea or for agreement on what should follow. Similarly, Eduardo used his relative expertise with the mechanics of written language and his monitoring skills to question verb tenses, correcting "is" when Karl used an inappropriate "was" and other aspects of mechanics. Perhaps his role as the collaborator of an energetic initiator like Karl, forced Eduardo into the expertise of monitoring, but his skill at mechanics was also noted by his teacher. As in other pairs, each child brought a set of expertises that came into play, and this complementary set of expertises determined the course of change in story elements in each pair. While Karl's expertise on story structure elements influenced Eduardo, and Eduardo's precision with language influenced Karl, other pairs used and exchanged different features. Anna's emotional expressiveness and use of affective descriptions seems to have loosened up Kasha, who began noting characters' feelings in her post-collaboration stories, while Kasha's narrative style helped Anna increase her control over the structure of her writing. Similarly, Melanie's descriptive flair expanded Catherine's terse style, and Catherine's methodical portrayal of simple stories helped Melanie elaborate her story schema. As Karl proposed to give characters the names of real

people, for example, he established the basis for extending his partner's ability to develop characters, which the partner had not done at all in previous writing. And as Kasha contested her partner's suggestion to always use boys' names, she provoked work in her partner's zone of proximal development, because the use of boys' names had become stereotypical in her writing. Thus, peers share their complementary expertises as they are needed during the course of collaboration.

Collaborative Learning Processes

In exploring the nature of peer collaboration, this study began by searching for evidence of processes that might be similar to the expert/novice processes of generating and reflecting. Initiating and contesting were used to capture children's ways of teaching each other by generating new material—initiating—and by reflecting on what they had generated—contesting. The nature and frequency of initiating and reflecting indicate that there are some comparable expert/novice and peer collaboration processes.

Initiating text sequences appears to have served as modeling by these young peers who implicitly act as teachers. Initiations to begin a story in a certain way, to give characters the names of real people, or to add elaborate details to a physical description served not only to advance specific stories but also to spark the initiations and reflections of the other partner. Each child revealed his or her expertise, in part, by suggesting sequences from his or her knowledge of what should be in a story, as did Karl when he said "OK, how should we start it?" The partner would then participate in constructing an opening sentence, for example, or raise questions about it—whether such a sequence should be there at all or whether it should be phrased in some other way. For Eduardo, who had shown no signs of generating stylized story beginnings, let alone third-person narratives before he had worked with Karl, creating and contemplating story openers involved him in his zone of proximal development for that structure with Karl serving as his guide. Current cognitive psychology is emphasizing the explicit modeling of cognitive processes, but indirect instruction like that illustrated in this study is powerful when children are in control.

The contesting done by children in this study is also an example of a reflective process noted as being important in apprenticeship. Examples of contesting in this study show that even peers of relatively rudimentary skill can engage each other in such reflectiveness. Contesting served not only in the refinement of specific story sequences but also in the refinement of the children's story structure knowledge. Through using "once there was" with Karl and then questioning whether all stories had to begin with this specific opener, "Karl, man, how come you always do it with once?" Eduardo refined his control over the shape of stories. An important quality of cognitive apprenticeship is for the master to turn control over to the student when it is appropriate. Children do not appear to have skill at assessing their partner's performance and crafting the turnover of control, but this study shows how

children seize control from their partners—as Eduardo did when questioning Karl's story opener. Eduardo did this after going along with Karl's story openers in two other collaborations, while other children questioned each other right from the start. Since story writing was a new production skill for Eduardo, he may have needed several experiences constructing stories with Karl and using story elements consistently before he could question how they were phrased. Future research on peer collaboration should explore such patterns of control-taking by peers to determine their relationship to the expert's turning over of control.

It is important to note that several aspects of this study may have contributed to the occurrence of contesting. First, children were, as much as possible, paired across race so their perspectives and discourse patterns may have been different enough to require clarification. In addition, the writing prompts implicitly built the potential for conflict into the story prompts which may have sparked conflict among the story writers. Writing a story about what to do with a found bag of money, what to do with a helpless puppy, or how to present one's home to a foreign visitor, require some thought based on assumptions and beliefs that are likely to differ across individuals and groups. As discussed in the literature review above, research on peer collaboration processes has begun to identify contesting as a productive feature of peer collaborations, but there is more to learn about the circumstances in which children engage in productive conflicts. Do these occur mostly with peers? Are there important differences across socio-cultural or ability groups and different tasks?

Based on the prominence of generative and reflective processes in previous expert/novice research, these processes were the emphasis of initial phases of this study. Yet, this study also revealed that repeating plays a major role in collaboration. Repetition was an integral part of the collaborations and because of this repetition children had extensive exposure to new story elements in different contexts. While very young children often repeat each word or letter sequence aloud as they effortfully compose handwritten stories (Graves, 1982), the amount of repetition around specific story elements found in this study suggests a different level of use. It may be that children's spontaneous use of repetition as a text-production strategy is stimulated in part by the computer writing environment where the text unfolds dynamically on the computer screen as children work together. Repetition may also serve a social function, giving young children an easy way to engage in the task and with each other, while also providing an extended opportunity to develop and consolidate their understanding of "story." Repeating in this case was not mere mimicry. On the contrary, as children repeated each other's phrases they examined them, which may be supported by the fact that they internalized concepts they had formed but had not discussed in explicit terms. It is possible that the elements of story structure were already part of their knowledge from having read stories, but forming stories in this effortful way then brought this knowledge into productive life. By repeating sequences including a variety of story elements, children

eventually generalize about the structural features after they have attended to the surface features at issue or after repeating has served a pragmatic function of keeping them on track. Repeating takes considerable time and may not be the best way to work with a teacher, but it appears to flourish in peer collaboration and to be helpful. The design of this study does not allow us to compare the relative importance of highly-frequent repeating to the less frequent initiating and contesting, but the study does show that children use this process and that internalization occurs for structures that were repeated but not discussed explicitly. Thus, repeating should be explored further as a learning process and in relation to other powerful processes.

While initiating, contesting, and repeating occur in different patterns and appear to have different effects, they all involve intense engagement on the part of learners. Such active and engaged participation in a construction task has been said to be essential to learning by theorists of many different traditions (Bruner, 1966; Piaget, 1952, 1954, 1967; Skinner, 1968; Vygotsky, 1978), yet this type of construction around a task orchestrated by young peers has not been the focus of much recent research. It is remarkable that children made generalizations about the structure of stories—features of character development, plot, and story closure—even though most of their work involved forming surface features of the texts—not talking *about* story structure. Sometimes talk preceded text production, sometimes talk followed, and in some cases there were changes that had not been constructed orally at all. So the actual text appears to have been a focal point for the children—a focal point with which they were engaged. The context of creating a text served to give talk a relevant focus—a place to make and to test ideas that might otherwise be lost, and the children's text-centered talk and activity appears to be a major source for their internalization. In short, children had internalized literacy symbols like specific story structures from their collaborations, which sometimes involved more effort than explanation. The task itself may be a low-level support—an external organizing activity as well as focal point for the children, and because they are trying to work together, collaborating writers may pay more attention to their evolving texts than do writers working alone. The additional demands of keeping a common reference point in a collaboration and the need to make sure the partner has not done something unacceptable may also maintain children's attentiveness to the text in a way that helps them craft the text and learn from it.

Repetitions of actions are also reported to be what enables children to advance to new levels of cognitive complexity on their own as discussed within neo-Piagetian frameworks (Bidell & Fischer, in press). The two sequential story-writing experiences did not reveal the types of changes that peer collaborations did, so it may be that even though children can develop on their own through interactions with the world in concrete situations, that social interactions elaborate and advance individual developmental processes (Fischer, 1980). Such distinctions between individual and social construction are impossible to make with this study, but further research on the nature of developmental processes and the influences of different types of context seem

warranted by the extensive and productive use of repeating. Such research indicating that children use individual and social fuel for development does not mean that the expert does not have to be somewhere in the process. Rather, collaborating with an adult or much more able peer may not be necessary all the time.

Reconsidering the Role of Experts

While our notions of initiating and contesting are similar in many respects to the types of generative and reflective cognitive activities that adult masters have been reported to use when guiding apprentices, third graders clearly have certain limits as teachers. The children in this study requested and offered explanations to justify their proposals for story sequences, but their explanations tended to be implicit and directly tied to production of a specific text sequence, rather than explicit and metacognitive. For example, Karl's way of telling Eduardo that characters should be given last names as well as first names was to say "Joe what?" after Eduardo proposed only the first name, "Joe." Or children's strategy of posing alternatives as a way of generating material or reflecting on what they had already produced may go further as a composing strategy if it is explicitly discussed as strategy writers can use when they are stuck, for example. A more explicit discussion than "Joe what?" would have stated a point about the use of last names and a rationale for using last names, such as to symbolize the character's personality. In spite of its implicitness, the children's teaching was productive and generalized as evidenced by Eduardo's use of last names after such "discussions" with Karl. Such indirect teaching has been shown to be important in another study (Daiute & Dalton, 1988) in which one boy taught his partner about how to avoid writing boring stories by suggesting "Let's brighten it up a bit." The fact that forming two-part character names transferred into individual use might also be attributable to the fact that the children wrote several stories of similar types which provided contexts for the repeated use and discussion of elements, such as character names. Instruction on a principle in a variety of contexts is crucial (Bransford et al., 1989) for mastery, and these data suggest that practice writing and discussing similar types of stories over time—even in the absence of explicit teaching—is valuable.

Third graders are also obviously limited in the extent of knowledge and conceptual organization they have with regard to a subject, in this case story structure. Given the number of stories the teacher had shared with them and their relatively limited experience actually writing stories, these children probably had considerable inert or passive knowledge (Bereiter & Scardamalia, 1987; Whitehead, 1929) about stories—knowledge that they had not yet had the chance to use or to reflect upon. Peer collaboration might be especially appropriate for exercising and increasing awareness of inert knowledge, while collaboration with an expert might be essential for exposure to new knowledge or for the refinement and reorganization of

existing knowledge. And even though many artists and intellectuals claim to operate on tacit knowledge, awareness of certain principles helps when there is difficulty with the creative process (Perkins, 1981).

The teacher's expertise may be required when children's expertises with a specific kind of task or in a specific domain are exhausted or when the potential for exchange is limited. When the expertises of peer collaborators are exhausted, the teacher's input or a new task that prompts expertises not elicited by the previous task will be necessary. The types of interactions that fuel learning among peers like contesting or cognitive conflict may be most useful when children are at the point of initial elaboration of a concept (Mugney & Doise, 1978). Given their inert knowledge around "story" and initially weak story writing skills, these children may have benefitted from collaboratively constructing stories with peers. It is also possible that the exchange of expertises can lead to the generation of new ones, for example, the expertise to organize sequences in other than simple chronological order may be required as children's stories become more complex. In this case, the organizational expertise of a child which was not necessary when the texts were very simple would be appropriate. Subsequent cycles of expertises may be elicited by repeated collaborations around tasks of increasing difficulty. This suggests that a major part of the teacher's role is to observe these expertises, the contexts in which they flower and seed elsewhere, the results of the exchanges of expertise, and situations in which related expertises may evolve. Viewing students as experts may aid the teacher in setting challenging goals for students as well as in determining appropriate collaborative pairs.

Another notable feature of the peer collaborations analyzed in this study was its responsive rather than planful nature. While adults' scaffolding has been described as involving deliberate control over the management of a child's activity on a task such as completing a puzzle, the partners in this peer collaboration study appeared to proceed with regard to their own individual ideas and understanding rather than to control each other's performance. In short, the children's interactions were based on their needs rather than on assessments of the other's needs. Yet, the composing, instruction, and evaluation the children did was highly interactive, interdependent, and responsive. Children responded to each other's initiations by contesting or repeating and followed up on specific initiations, often for many turns of talk. In addition, the children offered help and critiques appropriately, although not always of the kind or depth that might have been requested. In the absence of having control turned over to them skillfully, children tended to seize control by asking questions, posing alternatives, or simply saying "No." Supporting activities like collaborative writing in school might provide teachers with a way to find out about children's needs and interests as they reveal them in peer interactions. Allowing children to take control rather than figuring out how to give it might be a way for teachers to understand diversity among their students.

In spite of knowledge limits and apparent lack of metacognitive control, the quality of collaborative effort exhibited by the children in this study offers insights about why adults' expert teaching often fails. The preponderance of repetitions suggests that, when teaching, adults might not leave children enough time to try out, formulate, play with, and synthesize the knowledge they have shared. Of course, the demands of the task including the assignment to generate a complete story, coordinate with a partner, to use a keyboard and word processing commands, etc., may have required that children repeat sequences simply to remind themselves of where they were in the process. But children's extensive use of repeating appears to be a production strategy that contrasts to adults' use of planning as a strategy to help them cope with task demands.

Similarly, the nature of contesting by these children, as well as the importance of contesting in other process studies of collaboration, indicates that challenging ideas is a way to construct and test out knowledge and rules. How often do teachers encourage students, especially young students, to question what they say? And if teachers cannot engage in such subversion with students, how often do they let them work together and prepare them to challenge each other's ideas effectively and to find ways of resolving and integrating diverse points of view? Teachers might sometimes be able to relax the learning environment by engaging in knowledge play themselves, putting forth proposals as well as providing models and right answers. Such coaching by a teacher might help foster independent creative and problem-solving skills. More explicit labeling of correct models and ways of going about problem-solving tasks could be used when students go off track or when they are ready to proceed to a conceptually different stage of development in the skill or subject matter. Studying such different types of supports offered by experts and peers among one group of children and teachers is a fertile area for future research.

As we note how effective children can be at sharing and acquiring knowledge, it is also important to consider the role of their previous literacy experiences. We do not know much about the literacy practices in the homes and communities of these children, but we know that the classroom teacher who participated in this study engaged her students in a variety of literacy activities. To increase children's informal involvement with literacy, the teacher made reading and writing a focus of the classroom and took a hands-on approach to literacy by involving the children in daily writing and sharing activities as well as oral and silent reading and discussion of good books, not just the basal. The teacher talked with the children about stories—characters, plots, etc., in a matter-of-fact rather than didactic way. Thus, the children had access to information about stories as well as experiences with stories. We do not at this time have data needed to contrast the success of collaboration by students of teachers who share and talk about books to those of teachers who do not, but the rapidity with which these students shared and expanded their story writing suggests that this experience was crucial. Nor do we have data to indicate the difference in development of children of the same teacher who

had the chance to exercise and integrate the knowledge their teacher had exposed them to versus children who did not collaborate. This would be a worthwhile study, and we would hypothesize that having the chance to make knowledge explicit in the child-like terms allowed by collaborative writing is essential to integrating information. Children need information to use in collaboration but they also need familiar and repetitive experiences in order to appropriate this information for their own use.

One question that might be raised from this research is if children's literacy knowledge is so amenable to peer influence, are incorrect models not as powerful as correct models? None of the children in this study exchanged blatantly incorrect notions of story, while they might have settled on an incorrect spelling of a word or may have developed overly rigid story structures, as Eduardo pointed out to Karl. In the absence of creative structuring of peer collaborations, children might be confined to limited insights they had gleaned from their peers. In contrast, a series of process studies on peer collaboration in different contexts suggests that if children are continuously exposed to models of the many ways to form stories through reading literature, to writing tasks structured in different ways, and to explicit instruction from the teacher, then their collaborative work with peers is a way to bring information they have gained from these other experiences into their active experience. Thus, "correct" models continuously influence children's use of the models offered by peers. This research suggests that the kind of work children do with peers makes it more possible for children to use and to integrate what they learn from expert sources. Children may be failing in school, in part, because experts' knowledge comes to them in ways that they do not understand or relate to. Knowledge from peers presented from a child's point of view, in a child's language, and from a person of relatively equal status may be easier to use, filtered by one's individual knowledge and whatever standards from the adult world that children have internalized as reference points. The peer's support may also provide a bridge between the way children think and perform in informal settings and the ways in which they are expected to think and perform in school (Gelman & Brown, 1986). Thus, the richness of the peer collaborations in this study is possible in large part because these children also have access to literature, a knowledgeable, communicative, and understanding teacher, as well as their individual resources and writing experiences.

If a teacher cannot take a child's perspective and play along with a child as well as convey her expertises, a peer may be a better collaborator. It may be that peers' equality in social status (relative to the status of teacher) and their similarity of youthful perspective enables productive communication. Since peers are relatively equal in status and understanding compared to children and teachers, children may be better able to use, to critique, to transform knowledge and skill with someone who shares a common perspective, understanding, language, and lot in life. And valuable socio-cognitive conflict may not arise in situations where social status dynamics override—"a strong compliance effect ... observed when the interaction takes place with an

adult"—"it is only through a style of interaction involving continual expression of doubt that an adult can succeed in counteracting this dynamic of compliance" (Mugny & Doise, 1978, p. 130). The peers in this study were not compliant with each other as the 15% contesting utterances indicates, but research contrasting the dynamics of teacher/student and peer collaborations is required to gain information on relationships between the differences and congruences among collaborators and the effects of those patterns of synergy.

This study shows that young writers can expand their discourse knowledge and use by writing stories together. The children's apprenticeship involved intensive formulation, reformulation, and reflection about evolving stories. These children engaged in generative and reflective processes, which were noted earlier as characteristics of productive expert/novice apprenticeships. This study adds to the increasing body of research on the role of social processes in learning and development. In attempts to understand more about the specific aspects of social interaction that affect intellectual development, we have compared peer collaboration processes to those reported in expert/novice collaborations. Clearly, children need experts as intellectual mentors, but engagement with peers provides a type of intellectual workout that is also essential to the mastery of subject matter and skills.

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NATIONAL CENTER FOR THE STUDY OF WRITING AND LITERACY
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The National Center for the Study of Writing and Literacy, one of the national educational research centers sponsored by the U.S. Department of Education's Office of Educational Research and Improvement, is located at the Graduate School of Education at the University of California at Berkeley, with a site at Carnegie Mellon University in Pittsburgh, Pennsylvania. The Center provides leadership to elementary and secondary schools, colleges, and universities as they work to improve the teaching and learning of writing. The Center supports an extensive program of educational research and development in which some of the country's top language and literacy experts work to discover how the teaching and learning of writing can be improved, from the early years of schooling through adulthood. The Center's four major objectives are: (1) to create useful theories for the teaching and learning of writing; (2) to understand more fully the connections between writing and learning; (3) to provide a national focal point for writing research; and (4) to disseminate its results to American educators, policy-makers, and the public. Through its ongoing relationship with the National Writing Project, a network of expert teachers coordinated through Berkeley's Graduate School of Education, the Center involves classroom teachers in helping to shape the Center's research agenda and in making use of findings from the research. Underlying the Center's research effort is the belief that research both must move into the classroom and come from it; thus, the Center supports "practice-sensitive research" for "research-sensitive practice."

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